

LAND USE ANALYSIS AND PROJECTION

by

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## INTRODUCTION

Communities develop as part of our social and economic system. The amount of land utilized by specific activities and the spatial distribution of such activities reflect the requirements of this system. However, the existing arrangement of land use is, to a large extent, a result of past growth and activities and, as these activities may have occurred in a haphazard manner, the pattern thus developed may not be that which is most efficient and orderly.

A community is a dynamic organism, constantly changing in a variety of ways to meet new needs and conditions. As a community ages, there are progressive changes in the social and economic structure, in the character of population, in the size of families, in changing or deteriorating structural conditions and in many other facets. But the greatest change is the result of growth itself. With the increase of population through natural increase or by migration, new living and working spaces must be added to the community. This demand may be satisfied by peripheral expansion, or by the internal rearrangement of land uses--either through the displacement of one use by another or by the infilling of vacant land--or by the more intensive use of land and existing buildings.

Whatever the nature of the growth, it is apparent that the land use pattern, as well as the amount of land utilized for a particular purpose, is constantly undergoing change. However, to prepare a plan for the anticipated growth of the community it is desirable to make an inventory of the present status of land utilization to show the

distribution of land uses and determine the amounts and ratio presently existing between each land use activity.

It was the purpose of this study to investigate various methods of collecting data for analyzing and projecting land use, and to determine the best methods to be used. In order to do this a considerable amount of investigation and experimentation was needed. Much of the material in this study is based upon the professional field experience of the author.

Most information from other sources pertaining to the collection, analysis, and projection of land use does not consider what methods are best to use. Therefore, some communities may use land use inventory methods that are time-consuming and costly. In this study an attempt was made to point out various methods open to communities and which methods may help save time and reduce the cost of carrying out an effective land use analysis and projection program.

#### COLLECTION OF LAND USE DATA

An inventory of how land is being used is not a primary goal, but one of the essential tools used in the preparation and administration of a comprehensive city plan. Land use surveys provide more than a knowledge of how land is being used; they have considerable legal significance. The community in exercising its planning and zoning powers must as required by law, give "reasonable consideration to the character of each district and its particular suitability for particular uses."

Land use surveys, for example, have two applications to zoning activities. First, they provide basic information on physical

conditions for the development of a comprehensive community plan. From such a plan come the decisions on how land is to be used in the future. Through the use of zoning ordinances these decisions can be carried out and enforced. A second value of land use surveys is in measuring the effectiveness of zoning ordinances by revealing how closely actual land uses conform to the uses prescribed by law. Such a comparison might reveal needed changes in the comprehensive plan or the zoning ordinances, or both.

Land use surveys will also reveal points in a community where most of the traffic is generated. They will show the relationship of shopping and industrial centers to the existing street and highway system. Future demands made on the existing traffic pattern because of new development can also be anticipated through the use of land use data. In addition, it is possible to see existing and potential parking sites and their relationship to roads, intersections, and heavy traffic districts.

A land use survey can provide the ground work for an industrial study by showing the location of existing industries, areas available for industrial expansion, and essential facilities such as highways and railroads.

The delineation of blighted areas by the use of housing quality information and land use data is one of the basic elements required in the participation of an urban renewal program. The intermixing of uses, a common cause of blight, can be seen clearly through the use of land use data.

Land use surveys also provide valuable information for the planning and development of community facilities such as schools,

public buildings, and recreational areas.

As with all research, the land use survey should be planned and programmed in advance. The purposes of the survey should be identified and the amount of information and the degree of detail needed should be balanced against their ultimate use.

There are, of course, variations in the scope and techniques of land use surveys. The technique employed will depend on such factors as conditions peculiar to the community, the detail of information desired, and to some degree on personal preferences. However, the following procedures are adaptations of those most commonly used in conducting a land use survey and are analyzed here in the hope that they will thus be more helpful and understandable to various localities which need to use them.

#### Base Maps

In general, the first step in preparing for an existing land use survey is to assemble a series of base maps of the planning area. It is advisable to select a map suitable for all phases of the various planning studies to be undertaken. Scale, accuracy, and coverage are all factors which enter into the selection of a base map.

Sometimes suitable maps are not available and a mapping program must be undertaken in order to compile a satisfactory map. Before undertaking a major mapping program, which might involve retaining a firm offering this type of services, several sources should be checked for existing maps. Some of the sources that should be checked are city offices, the county engineer, and

consulting firms that may have compiled maps in conjunction with public utility programs. In addition, federal agencies often map areas under study for possible projects, such as flood control. It is often possible to obtain several partially satisfactory maps from which a suitable base map can be drafted. If a map must be drafted and no maps are available from which suitable information can be obtained, it may be possible to find aerial photographs from which a base map can be adapted, although this may again involve the retention of an engineering firm that offers mapping services.

The scale of a base map will depend on several factors. Generally, the smallest scale suitable for field work which requires sufficient space for all the information that must be plotted, is 200 feet to the inch. Usually the largest suitable scale without involving sheets of unwieldy size or a series of several sheets which limits the versatility of use is 100 feet to the inch.<sup>1</sup> The scale will also be determined by the size of the area under study. For smaller urban areas a scale of 100 feet to the inch is practical and for larger urban areas a scale of 200 feet to the inch is generally satisfactory. However, under certain circumstances a scale of 1,000 feet to the inch may be necessary for large urban areas. Maps with a scale of 1,000 feet to the inch are often used in generalized or simplified land use studies. In addition, they are frequently used in publication work where the acceptable size of a map is quite limited.

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<sup>1</sup>Stuart Chapin, Jr., Urban Land Use Planning (New York: Harper and Brothers, Publishers, 1957), p. 198.

The size of the area to be mapped will be determined by the delineation of the "planning area." This is the area of the city, plus the surrounding lands which are expected to go into urban use during the selected "planning period," generally a span of time from 20 to 25 years into the future. The resulting base map should include all of the present built-up area with ample allowance for such future expansion.<sup>2</sup> Any available population and economic studies can be highly desirable aids in determining the "planning area."

Assuming it is decided a base map must be drafted, the next step is to determine how the map or maps should be prepared in order to provide all the information that will be needed. A complete set of base maps would include three combinations of information and usually would involve at least three maps, often referred to as Base A, Base B, and Base C. Base A is simply a street map; Base B is Base A with property and easement lines added; and Base C is Base B with structures added.<sup>3</sup> An additional map showing contours and other natural features may be necessary for future projection studies, but is not needed for the mapping of existing uses.

In drafting a base map certain established principles should be followed. Streets which are open (actually in existence) are usually shown in solid lines, and streets which have been dedicated to public use but are not open are usually shown in broken lines.

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<sup>2</sup>Ibid., p. 199.

<sup>3</sup>Ibid., p. 199.

The actual dedicated right of way width should be shown and not just the width open to public use. City limit lines are shown by a heavy dash and dot line.

Base A includes all dedicated streets, whether open or closed. In addition, public water courses or major drainage patterns, political boundary lines should be shown.<sup>4</sup> In general, all railroad or other public transportation rights-of-way should be indicated.

After Base A is completed, a permanent type print is made to preserve the original for additional copies or revisions. To this print are added data which will be required for Base B. Property lines and easements to be used on Base B can generally be obtained from county tax maps or from recorded plats in the office of the city engineer or county clerk. Occasionally, tax maps are not up to date and the property information may have to be obtained from the county Register of Deeds office. This requires a great deal of time and alternate sources should be checked before resorting to this procedure. Property information may often also be obtained from local title companies.

After Base B is completed a new print should be made, to which Base C data is added. Structure data to be used on Base C are obtained from aerial photographs and insurance atlases. The structures of commercial, industrial, and public buildings are generally shown as an approximation of the true shapes observed in aerial photographs or other records. The residential structures are usually represented by symbols of uniform sizes such as an open square. In

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<sup>4</sup> Shirley F. Weiss, "Basic Planning Studies," Local Planning Administration, Third Edition. (Chicago: International City Managers Association, 1959), p. 97.

residential areas, only the principle structures are shown. Sheds, garages, and other outbuildings accessory to the residential use are omitted.<sup>5</sup>

The final step in compiling a base map or base maps is to field check for discrepancies. This can be done at the time of the actual collection of existing land use information.

It has been the writer's experience that there is no substitute for good base maps. Because of the time and expense involved in compiling base maps and because there are no substitutes for good maps, it is important to establish procedures for keeping them up to date. Within areas of subdivision jurisdiction, it is possible to keep abreast of changes and to make additions as they occur. Prints of the base maps can be distributed to the agency charged with recording subdivision activity and all changes can be noted on these prints. In the case of new structures or converted buildings in areas where building codes or zoning ordinances are in effect, it may be possible to keep maps up-to-date through the building inspector or the zoning administrator. In areas where no building code or zoning ordinance is in force, changes may be handled through a city manager's office or the city clerk. If there is no agency covering this type of activity, periodic field checks are used to keep the base maps up to date.

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<sup>5</sup> Chapin, Urban Land Use Planning, p. 200.

### Classification of Land Use

After the base map or maps have been drafted the next step is to devise a satisfactory land use classification system. Generally, there are two kinds of land use, structural and non-structural. Each major structure, together with all accessory buildings and all land used in conjunction with the structure, is considered a separate use. A non-structure use, such as a parking lot or coal yard, includes all land devoted to that use. In many cases, the land may prove to have one use and the buildings on the land another use.

A classification system should include the various types of land use that need to be classified. For simplification, land uses can be grouped together according to similar characteristics, usage, or ownership. Although unique circumstances may require unusual categories in some communities, the suggested use categories that follow cover most circumstances.<sup>6</sup>

Residential: All land where the major structure is primarily residential, even though there may be commercial or other uses in the same building, except institutional housing structures such as transient hotels, YMCA, YWCA, clubs, jails, hospitals or similar structures.

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<sup>6</sup>The following classification system has been adapted from the system used by the Bureau of Municipal Research and Service, University of Oregon.

Residential, one-family: any parcel of land on which there is located a one-family dwelling unit.

Residential, two-family: any parcel of land on which there is located a two-family residence. Two single-family dwellings located on one parcel of land are included in this category.

Residential, multi-family: any parcel of land on which there are three or more dwelling units in one or more residential structures. Rooming houses are generally classified in this category.

Commercial: all land and buildings where goods, products or services are sold or exchanged, including retail stores, business offices, transient hotels, filling stations, theaters, amusement and personal or professional services.

Commercial, retail and offices: all land and buildings where goods or products are sold or exchanged or personal services rendered to ultimate consumer on the premises.

Commercial, service (Intensive): all land and buildings patronized by large groups of people on foot or by auto which induce traffic congestion or are characterized by fire hazard, noise or objectionable uses. Automotive sales, service stations and drive-in services are examples of service commercial.

Industrial: all land where the use involves application of labor to materials, the product of which is not normally sold to the ultimate consumer on the premises.

Industrial, light: forms of manufacturing, wholesaling, processing, storage or the like without objectionable characteristics.

Industrial, heavy: forms of manufacturing, processing, storage or the like which have objectionable characteristics due to the emission of smoke, dust, noise, odor, or traffic congestion.

Industrial, utilities: all land on which facilities for communication, power, water supply, sanitation and similar public services are provided. Such utilities may be under either public or private ownership.

Industrial, railroad: all land owned by the railroad except that land leased or available for other uses, in which case the land should be classified according to its particular use.

Semi-public: all land so used for restricted groups of the population that it assumes a quasi-public character. Churches and Fraternal clubs are examples of semi-public use.

Public: all land owned by governmental agencies: city, county, state or federal. The land should be classified according to its uses as well as ownership. Examples of this type use would be courthouses, city halls and Post Offices. Generally, this type of use is tax supported as opposed to non-tax supported semi-public uses.

Park: all land permanently kept in its natural state and landscaped or otherwise developed for recreational use.

Streets: all land used for public thoroughfares, or vacant land officially dedicated for such use, except in parks or cemeteries.

Water: all land within the mean water level of streams and lakes.

Vacant land: all land which is completely undeveloped and on which there are no structures.

Vacant land, open: all land which, because of its natural features or location, is unusable in its present condition.

Vacant land, platted: all usable platted acreage awaiting development.

Vacant land, agriculture: all land which is used for crop or livestock production.

The above classification is not intended to cover all circumstances. However, this classification covers all basic uses and with some adjustment some form or variation of this classification can be used. Located in the appendix is a master list of land uses.

#### Land Use Survey

After a land use classification system has been established the actual land use survey of existing uses can proceed. In general, there are two types of surveys: the inspection and inspection-interview. The inspection-interview survey is used when information is required in addition to the survey of land use. As an example, real property assessment surveys can be handled by this method.

The inspection type survey is generally used when only the collection of land use is required. In the inspection type survey a parcel-by-parcel inspection is made of the area under study. An automobile can be used in the areas that are not highly developed. In areas that are highly developed the survey is generally executed on foot. The use of an automobile is referred to as a "windshield inspection." In the "windshield inspection," survey at least two and sometimes three field workers are needed in each car. A driver

and one or two plotters equipped with base maps and accessory equipment such as land use classification list, pencils and plotting boards.<sup>7</sup>

If recent aerial photographs are available, structures can be sketched on the work sheets before going into the field. This aids in locating split lots, structure locations on large parcels of land and isolated structures not easily visible from the ground.

There are two primary methods of plotting land use information. The first method involves the classification of land use in the field. This method consumes less over-all time than the second method. However, some difficulties may be encountered if more than one survey team is working in the field. Periodically a certain type of land use may be difficult to classify. If each team is individually confronted with this situation, two different classifications may be assigned to the same use and the accuracy of the end product is diminished.

The other method involves plotting and writing down on the base map what actually exists and then the land use is classified at a later date. Usually, a series of symbols is devised which represent the residentially associated uses such as one-family, two-family, multi-family, schools, parks, and public utilities. An example of this technique is shown in figure 1 . The commercial and industrial uses are generally written down on the base map since there may be some question of defining them as light or heavy within each respective category.

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<sup>7</sup> Weiss, Local Planning Administration, p. 97.

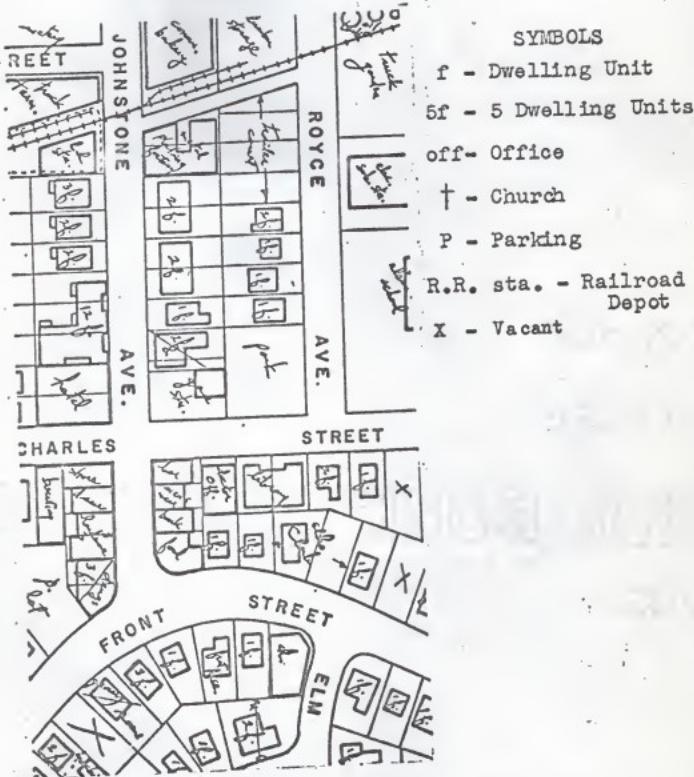


Fig. 1. Example of Symbols and Abbreviations Used to Represent Various Types of Land Use.

It has been the writer's experience that the second method is the better. With this method the classification of existing land use becomes more uniform and can be done during the analysis, thus contributing to the accuracy of the survey.

During the field work additional information may be desired. A structure condition or structure number survey may be integrated into the land use survey or such information gathering may be handled as a separate survey. The house or structure number information can be useful in street naming and numbering projects that might evolve at a later date. Information on the condition of structures is useful for determining areas having a blighted condition and which may call for special planning or development treatment. A special classification system is needed for classifying the condition of structures when such additional information is required. An example of a structure condition classification is shown below:

<u>Structure Condition Classification</u>	<u>Code Letter</u>
New structure. . . . .	A
Good structure, with need for minor surface repairs, shown by paint peeling. . . . .	B
Good structure with need for major surface repairs, shown by paint peeling, windows broken or putty out, gutters rusted through or sagging. . . . .	C
Fair structure with need for major reconditioning, shown by warped, broken or missing siding, worn roofing, loose chimney bricks, loose or sagging steps or porch floor. . . . .	D

Structure Condition ClassificationCode Letter

Dilapidated structure with obvious structural weaknesses, shown by sagging ridge line or roof rafters, cracked, broken or sagging foundation, doors and windows out of plumb, chimney bricks loose or missing. . . . . E

Substandard structure, shown by inadequate foundation, materials used for siding inadequate for weather protection, no inside plumbing, inadequate or unsafe flue construction, outside plumbing lines. . . . . F

An area having predominately D, E, and F structures would indicate a slum condition. Information from a structure condition survey will help in determining the extent of slum areas. The community can then take steps to curb or eliminate the blighted conditions.

The collection of land use data in large cities is usually performed by personnel trained for this type of work. In small communities, the collection of land use is often done by untrained city employees or some civic organization may undertake a land use survey as a community project. In small communities that have undertaken a survey without the aid of trained personnel, the survey can be carried out more efficiently if a professional planner is consulted to provide the initial organization and set up the procedures.

In four land use studies undertaken in Oregon the time required to collect land use data in communities with a population of less than 3,000 was approximately 1.1 man days per 1,000 population. In communities with a population of more than 5,000, the time required to collect land use was about .90 man days per 1,000 population. While this was a limited experience it would indicate that the time required to collect land use data decreases per 1,000

population as the size of a community increases. Time required to collect land use in four Oregon cities is shown in Table 1.

Table 1. Time required to collect land use.

City	Population	Man Hours	Man Days <sup>a</sup> Per 1,000 pop.
Roseburg (Valley city with relatively level topography)	12,200	80 hours	.82
Newport (Sea coast city with steep topography)	5,200	40 hours	.96
Toledo (Mountain city with about one-half of city on level topography)	2,950	26 hours	1.10
Sutherlin (Valley city with level topography)	2,750	24 hours	1.11

<sup>a</sup>Man Days = 8 hours work by one man.

#### ANALYSIS OF COLLECTED DATA

Any city needs a record of the way in which the land within its boundaries is presently used. The record of land use is not for the purpose of only ascertaining how the land is used. It provides the information necessary to observe the rate at which the city is increasing or decreasing its physical plant in the various classifications of land use. It offers a basis for measuring the amount of land needing to be reserved in zoning for future developments of the city, the quantity of land and the most appropriate locations for the various uses.<sup>8</sup> The results of a land use survey are

<sup>8</sup>Arthur B. Gallion, "The Master Plan," The Urban Pattern, (Princeton, N.J.:D.Van Nostrand, 1950), p. 245.

generally summarized both in map form and statistically. We will now consider factors involved in the making of a land use map, in measuring of amounts of land use, and in the tabulation of land use data.

#### Preparing an Existing Land Use Map

For various planning purposes, land use presentation may be needed at two or three different scales. Detailed work such as site planning and zoning case studies will require large scale maps. For land use studies concerned with large areas, a small scale map may be used which shows a generalized distribution of land use.

In addition to the scale of the map to be used, the media used to represent the various uses must be considered. Generally, a community will desire a colored map showing the entire planning area. This map will preferably have a scale satisfactory for viewing the entire planning area at a glance on one sheet and still have sufficient detail for handling the day-to-day problems. A general-purpose map is often placed in the city hall where it can be viewed by the public. In small communities, this map is often used for the review of zoning cases.

When making a colored land use map, a color code must be devised to represent the various types of land use. An example of a commonly used color code is shown in Figure 2.

One generalized land use map is usually represented in black and white thus simplifying reproduction problems. This map, unlike the general-purpose map, does not have sufficient detail for handling the day-to-day problems. It is used in studies of land use

	Pencil Number*
	Single-family 915
	Two-family 918
	Multi-family 946
	Commercial 925
	Light-industry 967
	Heavy-industry 936
	Public & Semi-Public 903
	Recreation 913
	Unused space 938

Fig. 2. Example of a Basic Color Code Used to Represent Various Types of Land Use.

\* Prismacolor pencil, Eagle Pencil Company

distribution on an urban-wide basis where planning analyses are concerned with broad patterns of uses. On this map various patterns are used to represent the different types of land use. The different patterns may be drafted directly on a master map, or Zip-a-Tone may be used on the master map.<sup>9</sup> The use of a Zip-a-Tone requires less skill, and corrections are less difficult to make. An example of basic Zip-a-Tone patterns used to represent various types of land use is shown in Fig. 3. An illustration of a black and white generalized land use map is shown in Fig. 4.

As a rule, all the uses in an area will be shown on one map if possible. However, special studies may require segregation of the basic uses. This type of special purpose map can be a line-drawing showing just the major streets, the city limit boundaries, and the particular use or characteristic desired to be isolated. An example of this type map is shown in Fig. 5.

#### Methods of Measuring Land Use

The measuring of areas covered by different types of land use is one of the most time-consuming phases of land use study. The maximum accuracy obtainable when measuring areas of land use depends in part upon the scale and accuracy of the work maps. There are four common methods of measuring areas of land use.<sup>10</sup> The

<sup>9</sup> "Land Use Classification Manual," Developed by the Land Classification Advisory Committee of the Detroit Metropolitan Area, Public Administration Service, Chicago: 1962, p. 12.

<sup>10</sup> Methods used by the Bureau of Municipal Research and Service, University of Oregon.

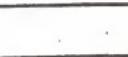
	<u>Pattern Number</u>
	Single-family      310
	Two-family      18
	Multi-family      4
	Commercial      330
	Light-industry      364
	Heavy-industry      564R
	Public & Semi-public      320
	Recreation      647
	Unused space      White

Fig. 3. Example of Basic Zip-a-Tone Patterns Used to Represent Various Types of Land Use.



Fig. 4. Example of A Generalized Land Use Map.

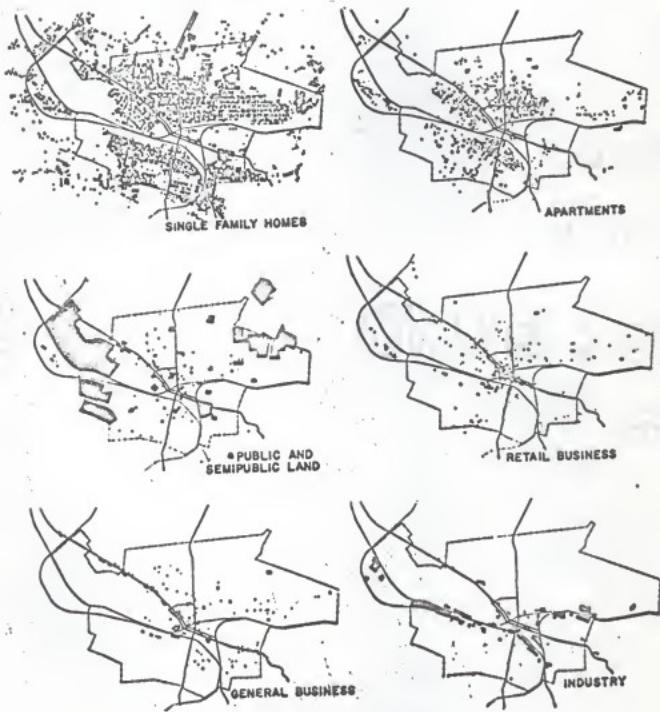


Fig. 5. Example of Segregated Land Use Maps.

following is an outlined breakdown of the methods generally used for measuring land use.

Method 1 - Area Computation

1. Divide area to be analyzed into blocks. Assign reference numbers to each block.
  - a. block may be the smallest unit completely surrounded by streets
  - b. block may be a larger unit (i.e., census tract, neighborhood, etc.)
2. Measure dimensions of block, including half of boundary streets, and calculate gross area in square feet or acres. Tabulate.
3. Measure each parcel of different land use and calculate area in square feet or acres. Tabulate and total developable area. Subtract net developable area from gross area to obtain street and alley area if desired. If block and lot size are consistant, standard block and lot areas can be arranged in a table for rapid reference. An example of a quick reference table is shown in Table 2.
4. Total individual land use areas and adjust decimal parts to equate to gross area. Accuracy can be to tenths or hundredths of acres. If working with square feet tabulation to the nearest square foot is generally acceptable.
5. Planimeter measurement of odd shapes such as rivers, curved street pattern areas, etc. may be necessary.

Table 2. Quick reference table.

Area - Square Ft./Acres								
	30	40	50	60	70	80	90	100
25	750 .014	1,000 .017	1,250 .023	1,500 .029	1,750 .034	2,000 .040	2,250 .046	2,500 .052
30	900 .017	1,200 .021	1,500 .028	1,800 .034	2,100 .041	2,400 .048	2,700 .055	3,000 .062
35	1,050 .020	1,400 .024	1,750 .032	2,100 .040	2,450 .045	2,800 .056	3,150 .064	3,500 .072
40	1,200 .023	1,600 .037	2,000 .046	2,400 .055	2,800 .064	3,200 .073	3,600 .083	4,000 .092
45	1,350 .026	1,800 .031	2,250 .041	2,700 .052	3,150 .062	3,600 .072	4,050 .083	4,500 .103
50	1,500 .029	2,000 .034	2,500 .046	3,000 .057	3,500 .068	4,000 .080	4,500 .092	5,000 .115
55	1,650 .032	2,200 .038	2,750 .051	3,300 .065	3,850 .076	4,400 .088	4,950 .101	5,500 .114
60	1,800 .034	2,400 .041	3,000 .055	3,600 .069	4,200 .083	4,800 .096	5,400 .110	6,000 .124
65	1,950 .037	2,600 .045	3,250 .060	3,900 .075	4,550 .090	5,200 .104	5,850 .119	6,500 .134
70	2,100 .040	2,800 .048	3,500 .064	4,200 .080	4,900 .096	5,600 .112	6,300 .129	7,000 .145
75	2,250 .043	3,000 .052	3,750 .069	4,500 .096	5,250 .105	6,000 .121	6,750 .139	7,500 .155
80	2,400 .046	3,200 .055	4,000 .092	4,800 .107	5,600 .129	6,400 .147	7,200 .165	8,000 .184

6. Additional information may be tabulated simultaneously with land use computations, i.e.:

- a. vacant building sites
- b. number of living units of each residential category
- c. number of commercial establishments, offices, etc.
- d. square footage of commercial buildings when over one story.

#### Method 2 - Squared Section

1. Divide area to be analyzed into blocks as in method one.
2. Overlay each block with a transparent sheet divided into squares. Each square can equal an acre or fraction of an acre at the scale of the land use map. Adjust overlay to coincide with boundaries of block and count squares and fractions thereof to obtain gross area. Include half of boundary streets as above. Tabulate.
3. Repeat operation for each land use. Subtract net developable area from gross area to obtain street and alley area if desired. If block and lot size are consistent, standard block and lot areas can be arranged in a table for rapid reference as in method one.
4. Total individual land use areas and adjust to equate to gross area.
5. Additional information may be tabulated as suggested in method one.

#### Method 3 - Area Sumation

This method is most usable when analyzing large areas, such as neighborhoods, as units.

1. Divide area to be analyzed into blocks as in method one.
2. Measure gross area of block by
  - a. planimeter
  - b. calculations from dimensions
  - c. squared section overlay.
3. Overlay block with tracing paper and outline a particular land use. Move paper to another area of same land use and add that outline. Continue until a composite outline of that land use is built up for the entire block. Measure area by planimeter or some other method.
4. Repeat operation for each land use in each block.
5. Total individual land use areas and adjust to equate gross area.
6. Additional information may be tabulated as suggested in method one.

#### Method 4 - Weight Measurement

This method is generally not considered as an acceptable method of measuring areas of land use. Accuracy and consistency of weights in later measurements seem to be the main criticism of this method. It is the intention of the author to present information which may establish this method as being as accurate as the other three methods. The method will first be outlined then information will be presented showing the results of research using this method.

1. Divide areas to be analyzed into blocks as in method one.

2. Using an uncolored or codified base map printed on plastic film\*, cut out the various types of land use. Keeping the uses separated according to the classification system used.
3. Repeat operation for each land use in each block.
4. Leave material to dry for 24 hours. Tests performed by the author indicate that the moisture from the hands have more effect on weights than the humidity in the air. When handling the material during the cutting, only the areas touched by the hands would be affected, thus creating moisture spots and causing an unequal distribution of weight throughout the material. By not handling the material for 24 hours, the moisture spots would dry to the per cent of humidity in the air, thus creating a more uniform distribution of weight.
5. After 24 hours, weigh each type of land use in each block. Handling the cut-out pieces of land use with a pair of tweezers. (This avoids moisture from the hands.)
6. Weigh a known area to determine a factor to be used for converting the weights into acres.
7. Total individual land use areas and adjust to equate gross area.

The weighing method has been used with maps printed on paper, but paper tends to be unsatisfactory because temperature and

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\* An example, is a film manufactured by duPont and registered under the trademark name of "Mylar."

humidity affect it. A piece of paper three feet square may contract and expand as much as 1/8 inch on the side. In addition, paper may vary in thickness. For the above reasons the author tried to find a material that would eliminate expansion, contraction, and variance in thickness as much as possible. After considerable investigation a plastic film was found to be the material most free from the factors affecting paper. The plastic film is often referred to as Mylar. According to the Dietzgen Company, Mylar contracts and expands less than .001 of an inch in a sheet 8 1/2 x 11 under normal drafting room conditions. Since Mylar is a plastic it does not absorb moisture. Plastic film can usually be ordered through any local print shop or office equipment supply store. In case the film cannot be purchased locally, it may have to be ordered through a firm located in a large city or by ordering directly from a firm that manufactures plastic film. An example of a firm handling plastic film is the Dietzgen Company. The county engineer's office may also be able to furnish information on locating plastic film.

Table 3 shows the results of research on weight tests of two grades of print paper and a piece of plastic film. The three sheets of paper and the piece of Mylar were seven inches by nine inches. The paper and the Mylar were handled in exactly the same manner during each weighing.

Table 3. Weight tests of paper and Mylar.

Date	Temp.	Room % Rel. humidity	Weights in Milligrams		
			Sample 1	Sample 2	Mylar
3/1/63	76	22	4199	3440	6268
3/5/63	75	30	4210	4104	6276
3/7/63	75	25	4208	3746	6274
3/12/63	76	32	4230	4155	6230
3/14/63	73	24	4205	3559	6270
3/19/63	76	23	4201	3462	6269
3/21/63	75	23	4203	3480	6270
3/26/63	72	15	4188	3313	6268
3/28/63	80	18	4196	3390	6268
Range			4230-4188	4155-3313	6280-6268
Difference			42	842	12

As can be seen in Table 3, the plastic film was the most stable material tested.

The scale used was an Ainsworth Scale Type D.L. manufactured by Ainsworth and Sons Incorporated. Weight measurements on this scale can be read to the nearest milligram with practically no value judgments involved. This type of scales may not be available in small communities. The scale used in the tests was made available through a state grain protein inspection station. A careful examination should be made of the time and cost involved in locating a scale of the type used by the author. The time and cost of locating a scales may be greater than the time and cost saved through the use of the weight measurement method.

A later study was undertaken to determine the amount of time involved to analyze a city by this method and by the other three methods. The results of this study are shown in Table 4.

Table 4. Time involved to measure land use.

	Hours	Total Area of CITY Expressed in acres
Method 1	63	776
Method 2	41	789
Method 3	38	802
Method 4	12 plus 24 hrs. to dry	794

The results indicate that the weighing method requires considerably less actual work time. The total area of the city as shown by the four methods also suggests the weighing method is relatively accurate. The accuracy of the weight measurement method would depend upon the scale of the map to be analyzed. If the scale used is one inch equals 500 feet or smaller the accuracy of any method used would be considerably less because of the value judgements to be made during the measurements. During the tests made by the author, pieces of film measuring 1/4 inch by 1/2 inch and having a scaled area of 5,000 square feet were weighted. The weight was then converted to square feet by the use of a predetermined factor and the weight measurements were found to be 98 per cent accurate. It has been author's experience that very seldom a land use analysis will contain a single classification with a total area of less than 5,000 square feet.

The size of the area to be analyzed should be considered before the weight measurement method is used. For example, if the area to be analyzed is a city block, the time to measure the area would

be considerably less than the time involved in cutting out and weighting the different types of land use.

#### Statistical Recording of Land Use

A statistical analysis of land use is generally prepared in terms of acreage devoted to each category of use employed in the survey, with an added category to summarize the acreage of land that is vacant or in non-urban use.<sup>11</sup> Acreages are summarized in terms of percentages, usually in terms of the developed area of the city proper, the fringe areas, and the planning area as a whole as covered in the survey.

The type of statistical analysis in any given situation will be determined by the problems under study. As an example, zoning studies require a knowledge of the amount and per cent of land used for various purposes. A comparison of how land is being used in various cities can also be made through the use of statistical summaries.

There are numerous methods of statistically recording land use data. However, two carding methods are in most common use. The first method involves the use of a card upon which land use information can be recorded. When doing a block-by-block analysis a card should be filled out for each block. Each card is filled out in a way which readily shows various types of information. It is possible to tabulate information by block, tract, zoning, area,

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<sup>11</sup>Stuart Chapin, Jr., Urban Land Use Planning (New York: Harper and Brothers, Publishers, 1957), p. 220.

school district, and fire zone. A card file of land uses, each card bearing information on a single block of land, forms a ready reference of this type. Illustrated below is an example of a card developed to classify the land use categories listed. An example of a summary table of the total land use in an urban area is shown in Tables 5 and 6.

Table 5. Total land use in an urban area.

BLOCK	Gross Acres	USE ZONE
TRACT	Net Acres	FIRE ZONE
SCHOOL DIST.	Date	
		Units      Acres      Comments
1 Residential	1	_____
1a One-family	1a	_____
1b Two-family	1b	_____
1c Multi-family	1c	_____
2 Commercial	2	_____
2a Retail and Offices	2a	_____
2b	2b	_____
2c	2c	_____
3 Off-street parking	3	_____
4 Industrial	4	_____
4a Light	4a	_____
4b Heavy	4b	_____
4c Railroad	4c	_____
4d	4d	_____
5 Utilities	5	_____
6 Public	6	_____
7 Semi-public	7	_____
8 School	8	_____
9 Park	9	_____
10 Street	10	_____
11 Water	11	_____
12 Vacant	12	_____
12a Agriculture	12a	_____
12b Residential plats	12b	_____
13	13	_____
14	14	_____

Table 6. Summary of land use.

Use	Example of Area	Summary Table of Land Use				
		Gross Area	Gross Less Water	Gross Less Water & Streets	Gross Less Water Streets	Net Developed Area
Residential						
1-family					Vacant	
2-family					(Open)	
Multi-family					Vacant	
Commercial					(Platted)	
Service						
Retail						
Offstreet Parking						
Industrial						
Light						
Heavy						
Railroad						
Utilities						
Public						
Semi-Public						
Schools						
Parks						
Street						
Water						
Vacant (Open)						
Agriculture						
Residential Plats (Vacant)						

Still another method involves the use of IBM cards. The IBM record method is particularly useful in large metropolitan areas where summaries would require a great deal of time if performed by hand. In small communities, unless combined with tax assessment records where IBM systems of record keeping are already in use, this system of recording land use data may be too expensive or unnecessarily complicated for the volume of cards required.<sup>12</sup> Before a city decides to record land use data on IBM cards, a data processing firm should be contacted to determine the cost involved in using this method.

#### LAND USE PROJECTION

A community's future land use requirements cannot be projected with complete accuracy. Meaningful estimates can be made, however.

The projection of future land use is one of the most complex and time-consuming parts of planning. Essentially, it is concerned with the estimation of the acreage required to accommodate the expansion anticipated during the planning period. Although the final product of many studies is expressed in terms of acreage, the work involved in arriving at future land requirements utilizes different measurement units, such as employees, dollar sales, dwelling units, and population. In addition, the sociological attitude and economic or speculative desires of people must somehow be measured. Another important facet and perhaps the most important is the availability of developable land and its locations. Thus, it is

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<sup>12</sup>Ibid., p. 213.

not possible to make valid projections of future land needs as a direct consequence of existing land use studies. The existing land use studies are only one aspect of the data collection stage of comprehensive planning. Economic base studies, population analysis and many other subjects are involved in these preliminary studies. These economic and human factors must first be projected. Only after this has been done do we have a real basis for physical land use projection which must draw on all such factors. In short, land use studies cannot lead the way in planning; they are determined as a consequence of the human, economic and technological trends which are more directly predictable, and from the existing land use study as a base or starting point.

#### Economics

The first phase of land use projection involves the careful analysis of a community's economy which will reveal much about the future prospects of a community. As an example, economic studies help reveal why a city exists in the first place, how it has developed to where it is today and what its future prospects are. Stated another way, most metropolitan areas exist because they serve as centers for the production and distribution of goods and services. Production and distribution functions create jobs, and employment opportunities attract people, who in turn symbolize the city.

Thus the urban economy conditions the amount of land development that occurs. An expanding economy will generally indicate the growth of new business and industries and an increase in

population, which means more land going into use. Similarly, economic forces that are responsible for leveling off or decelerating trends in economic activity may indicate that a city is in a state of status quo or possible decline. A knowledge of the trends of growth, leveling off, or decline in economic activity will help in determining future land requirements. For example, studies of employment and employment trends are a key element in population forecasts, and population estimates are used in scaling future land needs. Estimates of future land requirements for industrial purposes are based on manufacturing or primary industry employment trends, and future space needs for commercial uses draw upon employment trends in wholesale trade, which, in turn, have relationship to the basic employment of the area.

Because of the specialized and complex character of the work involved in an economic analysis it is advisable for a city to retain the services of an experienced economist for this aspect of a plan. We make no serious effort to outline an economic base study or economic projection here, but mention them only to stress their vital importance as a prerequisite to an effective land use projection.

#### Population

A comprehensive land use projection program for the physical development of a community must be based on the requirements, both present and future, of the people living in the area. In order to estimate what these requirements will be, it is necessary to know

as accurately as possible how many and what kind of people will be living in the community in the time period being considered in the plan.

Based on an estimate of future population, once obtained, it is possible to determine the approximate size of residential, commercial, and industrial areas which will be needed; the size and number of schools, parks and public facilities; the size of arterial streets and the demand for sewer, water and power service. These requirements can then be translated into a coordinated plan for physical growth which can result not only in a more satisfactory environment, but can also be the means of effecting substantial savings in public expenditures. The advance acquisition of land for schools, parks and thoroughfares before development makes site costs less prohibitive. And the design or location of sewer, water, power, schools, hospitals and fire protection facilities to accomodate future needs are examples of the economic advantages of land use projection.

It is impossible to predict precisely what the future population of an area will be. But, a carefully calculated estimate is likely to be better than a random guess, and if provision is made for periodic review and refinement of estimates, as should be done with any competent planning program, the value of the study will increase accordingly.

It is essential that the forecast of future population be as accurate as possible. Over-design can be as detrimental and costly to a community as the lack of adequate planning. Based on present growth trends and an estimate of future development, a population

forecast can be made with sufficient accuracy to serve as a framework for planning. Several techniques have been developed for this purpose. Although population forecasting as such is beyond the scope of this paper, an effective technique should include such primary elements as:

1. An estimate of future in and out migration, based on employment estimates derived from a thorough analysis of the economic prospects of the community.
2. An estimate of natural increases or decreases (i.e., the net differences between local births and deaths.)
3. Estimations regarding the number of people that will be added to the population as a result of annexation and in what directions such annexations are most likely.
4. Information on age, sex, race and ethnic group trends.

#### Community Attitude

City planning commission members have long been charged with the duty of trying to find answers to questions such as, "What kind of a community do the citizens want? What are the living standards they will consider minimum? What forms of civic design do the people want?" Answers to these and many similar questions form the backbone of a general plan and are used as partial basis for design of the future land use map. After all, city planning is not just a function of trying to outguess the future. Its primary purpose is to lead the community into a better environment than would result from hapinstence.

More objective answers might be had for questions of public desire if the questions were answered directly by the people of the community by the use of public opinion surveys. But, such studies have inherent dangers. To what extent are people capable of expressing desire when dealing with the new and unknown circumstances of the future? For that matter, to what extent can the planner properly claim superiority in this respect?

Although public opinion survey techniques have reached an advanced stage of development, city planning agencies have yet to make full use of them as a tool for sampling questions such as those mentioned above. Some early exploratory work of the Princeton Bureau of Urban Research and the Detroit surveys of the University of Michigan and Wayne University indicate the potentialities of sampling surveys for providing answers to these often subjective questions on an objective basis. However, much work remains to be done in perfecting the mechanics of interviewing in order to get at the latent as well as the more articulated notions of livability that people hold. Until the results of this kind of research become available and can be tested, it can be expected that only limited use will be made of attitude surveys. Research work is presently being carried on at Kansas State University which may provide some of the answers to the problems which now restrict the use of attitude surveys. The attitude survey being developed by James J. McGraw in conjunction with Alan M. Voorhees is basically a rating technique devised to gain knowledge of how local residents relate themselves to certain community facilities and conditions. The results of this type of

survey instrument should be carefully analyzed by the professional planner and his staff and much caution should be exercised before broad general conclusions are made. The most profitable use of this type of attitude survey is to obtain general information concerning real or potential attitudes of community dissatisfaction and to enable the planner to prepare a detailed study of the factors related to this dissatisfaction before he embarks on a specific planning project.

#### Future Land Requirements

After the future expected economic situation, population change, existing land use pattern, and other objectives of the community have been determined, the next phase is to estimate future land needs. This involves the selection of a basis for scaling the land area needed to accomodate growth in the planning area expected in the next 20 to 25 years.

A first step is to establish location standards. To a certain extent, this becomes a design problem that will be scaled into proportion as land requirements are established. In most cases a relationship and location of land uses have already been established as the character of the community has developed. It may be a good or a bad relationship. By establishing location standards, areas of conflicting land use can be eliminated in at least future development.

Location standards are usually expressed in the form of accepted principles, standards and policies for the placement and relationship of uses on the land, written in the form of public policy

guides or regulations. These requirements are concerned with the location of each individual use in relation to every other use and to the other elements of the community. They form a broad basis for such detailed regulations as subdivision and zoning regulations as well as for land use projections in master planning.

#### Space Requirements

Commercial. The determining of future commercial land involves first the defining of the existing area devoted to commercial activity. This would include all blocks with 50 per cent or more of their principal floor areas devoted to commercial uses.<sup>13</sup> Once the commercial study area has been defined, the next step involves the recognition of the various sub-uses, such as entertainment, financing institutions, offices and other functional groupings. Assuming a satisfactory grouping can be made, acreages are then determined for each class of uses, including streets, parking lots, landscaping, outdoor sales, and other pertinent factors. Included in this summary will be the commercial activity located on the above ground stories of any building.

After establishing the existing relationship of existing uses in the commercial area, an "increase factor," is needed for making estimates of future space requirements. This factor is usually expressed in terms of acres of floor area for each sub-use per present 1000 population. In multiplying the future expected population by this factor a reasonable estimate can be made of the future floor area. Some adjustments may be needed to allow for changing trends

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<sup>13</sup> Stuart Chapin, Jr., Urban Land Use Planning (New York: Harper and Brothers, Publishers, 1957), p. 323.

in merchandising or for other special considerations.

Another factor that is often used is the retail sales index expected in the future. It may be wise to use both of these factors in a manner that will serve as a cross-check for accuracy.

After the future floor area for each type of commercial use is determined some scale of building height must be established in order to make the adjustment of floor area into a realistic form of actual land required. Local conditions will often determine or influence the height of buildings. These must be investigated. Recent construction trends will also influence building heights. Once the anticipated building heights have been established and the floor area converted to area of land, the next step requires the addition of land to make up deficiencies in off-street parking and loading, open spaces, drives, and land subtracted or added for renewal purposes. These deficiencies are usually determined by local standards or policies. One of the most significant factors in determining commercial projection is the decentralization trend. Suburban centers involve cheaper land than is available in a central business district. Low density, single story construction is the mode. In contrast to the conservative parking facilities of the central district, suburban developers often demand a ratio of four or even six times as much area for parking as for retail floor space. Clearly, a careful study of such local trends and of local "Blue Laws" or other factors which may influence that trend is necessary. Decentralization dominates the commercial growth of many communities. A study which ignores its implications is worthless.

Only after such studies have been completed can the total area required then be adjusted or distributed on the future land use map with consideration being given to the direction of growth, land values, street patterns, and public or speculative pressures.

Public Facilities. These facilities include transportation (streets, rail, airport location, etc.), utilities, public buildings, parks and other public and semi-public uses. The future space required for these uses are generally analyzed as part of the use category to which they are associated. As an example, the central post office, civic center, and city functions will generally be included in the central business area study and parks may be included in the space needs of new residential areas. Many times, the space requirements for these facilities particularly for large volume needs such as parks, are determined through special studies to supplement the general land use projections.

Industrial. The first step for estimating future industrial land involves a summary of the acreage presently devoted to the various sub-classes of industrial uses. The sub-classes will include manufacturing, wholesaling, processing and possibly other categories. Once the present acreage is determined a factor can be established defining the number of employees now engaged in each sub-class and expressed in terms of employees per acre of gross industrial land.

The next step is to determine the ratio of present population employed in manufacturing, wholesaling, and processing. This ratio is then applied to the expected future population. The factor of

employees per acre of industrial land is then multiplied by the expected future population employed in the various sub-classes of industry.

Estimations of future industrial land are difficult to make because of the differences in plant design and of not being sure of future technical advances in industry. In recent years there have been strong tendencies toward industrialization, toward horizontal processing, toward lowered percentage of lot coverage, and toward automation, all of which work to change the employee/acre ratio. Such factors, as they apply in the specific locality, must be studied in detail.

A safety factor is therefore sometimes built into the estimations for future industrial land. This might involve marginal land earmarked as "industrial reserve." The problem of how to re-serve the land for industrial uses and still permit the owner to achieve a fair return on his investment raises complex legal and economic questions which must be resolved.

Residential. The final major land use projection category involves the residential communities of the planning area. Residential communities are the largest users of space, consisting mainly of dwelling areas, but also including accessory community facilities such as schools, churches, and recreational areas. Small shopping centers might also be included as part of this general category. The relationship of these facilities is very important in order to arrive at a meaningful scale for land use projection.

The first step involves a summary of the existing dwelling units, a summary of existing acreages in dwelling areas, and a summary and area break-down of present densities. For control purposes it is best to divide the residential areas into planning districts which are often referred to as neighborhoods. The dwelling unit count and the acreages can be taken from the statistical summary of land uses. From these two series of data the net densities can be computed. Densities can be computed at the neighborhood level or at the block level. Table 7 illustrates how density calculation can be made. Densities should be figured

Table 7. Dwelling unit density.

Planning Area	Single-family		Two-family		Multi-family	
	D.U.	Acres	Density	D.U.	Acres	Density
1						
2						
3						
Total						

separately for the neighborhoods of predominantly different housing types located in the community. Small communities may have only three types of housing such as single-family, two-family, and multi-family housing. Large cities generally have several types of housing ranging from single-family to high-rise apartment buildings. In addition to the density summary, the over-all and area trends on construction and conversion of dwelling units need to be analysed. The data necessary for this can often be obtained from building permit records. The construction and conversion summary will indicate trends on building types and areas of development. The building

types are generally summarized in tabular form and the areas of development are usually plotted on a map. Table 8 illustrates a way in which these analyses may be summarized.

Table 8. Building activity.

Planning Area	New Dwelling Units			Total number D. U. added
	1 family	2-family	Multi-family	
1				
2				
3				
Total				

Certain assumptions must be made in projecting future residential land. These include changes in household size during the planning period, depreciation, deterioration or loss of existing dwelling units, and changes in the vacancy rate. A trend in the change of household size can often be established by the use of past population census figures. By comparing the present household size to the present population and the assumed future household size to the future population, the difference between these two results provides a crude unadjusted estimate of the total new dwelling units required in the future.

Estimates of losses of current dwelling units can usually be covered in three categories: losses through public renewal programs, other use invasion, and losses by fire and other catastrophies. Losses by public renewal can often be anticipated by the use of a structures condition map constructed from the data collected during the land use survey. Losses by use invasion (change of use) can be estimated from the projection made for the business

and industry. The losses by fire and other catastrophes can be calculated by the use of records on local observations. These losses may have to be adjusted in anticipation of improvements such as new fire fighting equipment. Table 9 illustrates the way in which these analyses may be summarized.

Table 9. Dwelling unit losses by 19XX.

Planning Area	Present number of D. Units	Renewal	Losses	Catas-	Remaining
			Inva-		
1					
2					
3					
Total					

Residential vacancy rate assumptions are often hard to make. A five per cent vacancy ratio has been in common usage in estimating future requirements. However, this rule of thumb figure may not be suited to all situations. As an example, special seasonal studies may be desirable in urban areas having significance as resort centers.

Still another phase of estimating the future residential land needs is to determine the breakdown of housing types into density types, in terms of dwelling units per acre. These densities are usually based on local standards since they are closely tied to the zoning regulations. Table 10 illustrates the way in which these analyses may be summarized.

Table 10. Residential density standards.

Dwelling Unit Type	Dwelling Units Per Net Acre Desirable	Dwelling Units Per Net Acre Maximum
One-family		
Two-family		
Multi-Family		

A table has to be developed for each planning area.

Once the residential density standards have been established the next step is to determine the logical allocation of density types. This involves making assumptions as to how many single-family units should be allocated to the density types appropriate to this class of residential use, how two-family units are to be allocated, and so on. To show how the allocation of densities works the following illustration is made: Based on present land use patterns and apparent trends in changing living patterns, 30 per cent of the added single-family units will be allocated on 15,000 square-foot lots and 70 per cent on 6,000 square-foot lots; all two-family units on 7,000 square feet lots, and so on. When making allocations the vacant and renewal land is generally developed according to some combination of standards already established by the land as it is subdivided. Table 11 illustrates a way in which these analyses may be summarized.

Table 11. Allocation by housing and density type.

Density type	Housing type	Assumed Aver. No. D.U./Net Acre	Total Requirements D.Units Acreage
Low	Single-family		
Medium	Two-family		
High	Multi-family		

The final phase of residential land use projection involves the summarizing of all previous steps. This can be done in one summation as illustrated in table 12. It must be remembered that periodic adjustments to these predictions will be necessary as conditions change or as time permits new knowledge to develop.

Table 12. Summary of Land Area Required.

Planning Area	Current Pop.	Existing House-D. Units		Remaining hold	Added D. Units	By End of Planning Per. Total D. Units	
		Pop.	D.U. size			by 19XX	by 19XX
1							
2							
3							
Total							

Local Business. In some communities the land requirement for future local business may be very small in comparison with that for other land use categories and, as a result, it may be conveniently made a sub-heading of residential use in the suburbs rather than included in the business study. Estimating the land required, is based in part on the local trends and can usually be expressed in terms of local or suburban business land per 1,000 population.<sup>14</sup> A sliding scale may be desired since multi-family areas may require a different standard for shopping facilities as compared with the single-family areas. The next step is to evaluate the existing neighborhood commercial facilities and try to determine what local business facilities will be retired during the planning period.

<sup>14</sup>Ibid.

Such estimates should be extremely conservative. Neighborhood stores tend to be monopolistic, and lack of competition may perpetuate demand for such facilities long after they have so deteriorated that they have become a physical menace to the neighborhood. An adjustment can be made following this review of existing conditions to calculate the net additional local business land required. The next operation is to add the amount of land required to the amount of residential and residential-related land that is to be displaced.

Schools. The method used to determine the land required for future schools is based on future enrollments and local standards of school enrollment. The first step is to determine the local standards for class room size (expressed in terms of square feet per student and number of students per classroom.) The second step is one of estimating future enrollments. This can be done by determining a ratio of what per cent of the total future population will be of school age and at what grade level. These calculations usually have been developed over the experiences of many years and can generally be obtained from the local school administration. Another source of this information is from U.S. Census data. However the U.S. Census data does not always give the local trend on the number of students leaving school before graduation. Once the ratios have been determined, a total enrollment figure can be obtained by grade for each neighborhood. After the calculation for this phase is completed the next step is to convert the total enrollment to the number of classrooms, the number of school

units, and the number of acres required and assign the space requirements to the appropriate neighborhoods or planning districts. In some cases two or more planning districts may fall into a school service area. The final step is similar to that employed in estimating the land required for local business. This involves the adjustment of the residential land projections by the addition and distribution of the school land required.

Recreation Areas. The recreation land required in a community will be determined in part by national standards, in part by local conditions. Illustrations of this variation would involve the community's size, density, and proximity to recreational facilities such as lakes, mountains, or oceans. A community located close to facilities such as those mentioned would not require the same recreational facilities required for communities having different environmental conditions. The planner should be cautioned about over-generalizations here. The need for some form of play space for children in all neighborhoods is not diminished by resort facilities away from the community. A set of standards must be developed for each local situation. The standards must take into account the different age groups to be served and the minimum site size needed to serve each purpose. The standards will usually be expressed in terms of acres per 1,000 population.<sup>15</sup> An example of recreational standards is illustrated on the following page in Table 13.

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<sup>15</sup> Miriam Strong, "Recreation and Open Space," Local Planning Administration (Chicago: International City Managers Association, 1959), p. 259.

Table 13. Recreation standards.

	Acres Per 1,000 population
Playground	1.50
Park	1.00
Playfield	1.25

In recent years there has been a trend toward developing combined school-park facilities. By developing school-park facilities there is less duplication of facilities and thus a considerable amount of public funds can be saved. This type of facility would require an adjustment in any independent standards set for schools and recreational facilities. Its feasibility may also depend upon local political attitudes of cooperation. Once the land required for recreation facilities has been determined the final step involves the further adjustment of residential land to allow for that displaced by the recreational land required.

#### Application

A community's future land use requirements can rarely be projected with complete accuracy. A city, even a small community, is too complex and contains far too many uncontrolled or unpredictable factors for that to happen. Therefore, changes in land projections must be made as conditions change. Any master plan based on such estimates of land requirements must be flexible. But, as this recognition of human limitation has become apparent, the validity of master planning techniques has improved accordingly. No longer does the competent planner try to make flat, static,

firm predictions. He has learned that certain human inter-relationships of basic needs do have relative constancy. He therefore prepares his plans and proposals within a flexible context. He makes his best predictions of over-all trends with due recognition of their fallability. He then makes his more detailed predictions and proposals: If such and such an over-all trend in fact develops, it will result in the following combination of needs at specified population growth periods (as contrasted to specific date predictions); but if the over-all trend takes an alternate course, it will result in the following alternate community needs.

This technique may not be as impressive to inexperienced local leaders as were the older soothsayer techniques. Certainly, it does not eliminate the need for frequent review and updating of all planning studies. But, its flexibility greatly simplifies the needed periodic checks for validity and, therefore, greatly increases the local usability of the end product.

In addition, it must be remembered that in order to reserve and develop land according to a plan, certain regulatory measures are needed. These will include zoning, subdivision and housing regulations, and such other regulations as may be deemed necessary to carry out the plan. The kinds of existing land use studies, development standards, land use projections, and other techniques which have been described in this study will be invaluable in the preparation and administration of such regulatory measures.

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**APPENDIX**

## APPENDIX I

## Land Use Classification

The following land use classification system was devised by the Northeastern Illinois Metropolitan Area Planning Commission. This list does not include all of the different possible land uses. However, it does contain a sufficient number of different land uses to serve as a guide for classifying those uses found in any community.

Each of the land uses listed below has been given a place within the land use classification system, indicated by a reference number for three different basic map scales--community, county, and metropolitan. For example, a barber shop falls in category 21.1 for community surveys (column AA), in category 21 for county surveys (column B), and in category two for metropolitan surveys (column C).

The fourth column in this index contains suggested letter designations for certain uses which require special description. This is most important in describing uses that fall in the Public, Cultural and Related category, since the full names of these uses should be printed on the final map. Appendix II contains a fuller list of letter designations.

Many communities prefer to make the traditional distinction between "light" or "heavy" industry so that the more intensive, noisy, smelly or large-area industries can be relegated to certain places in the city or town. But the definition of what constitutes a "light" or "heavy" industry depends primarily on what already exists in the community. At present, many industries traditionally thought of as being "heavy" are instead quite noiseless, non-smoke-producing

and, if sited properly, even attractive. This has tended to upset the definitions, and therefore, "light" and "heavy" are not included as use designations in this system.

LAND USE	Suggested Letter Designation			Reference Number For Each Column		
	A or B	C		A	B	C
<b>A</b>						
Abattoirs .....				31.0	31	3.1
Abrasives Mfg. ....				31.0	31	3.1
Academy, Private .....				52.0	52	5.2
Academy, Dancing .....				21.2	21	2.0
Academy, Riding .....				63.0	63	6.3
Accountants .....				22.2	22	2.0
Acetylene Mfg. ....				31.0	31	3.1
Acetylene Storage .....				32.0	32	3.1
Acid Mfg. ....				31.0	31	3.1
Acaustical Material Mfg. ....				31.0	31	3.1
Acoustical Material Storage.....				32.0	32	3.1
Adding Machines <i>(See Business Machines)</i>						
Addressing & Mailing Service <i>(See Office Service)</i>						
Adjusters .....				22.0	22	2.0
Advertising Display Mfg. ....				31.0	31	3.1
Advertising Offices, Agencies.....				22.0	22	2.0
Advertising Photography Studios .....				22.0	22	2.0
Agricultural Implements Distribution & Display.....				32.0	32	3.1
Manufacturing .....				31.0	31	3.1
Repair and Service.....				31.0	31	3.1
Sales .....				21.1	21	2.0
Agricultural Tillage, Contractors, Yards .....				32.0	32	3.1
Air Conditioning Equipment Custom Fabrication and Installation .....				32.0	32	3.1
Air Express Service, Office .....				22.0	22	2.0
Air Express Service Warehouse....				32.0	32	3.1
Air Freight Service .....				44.0	44	4.4
Airline Companies Office .....				22.0	22	2.0
Airplane Beacons .....				44.0	4.1	4.4
Manufacture .....				31.0	31	3.1
Repair, Storage, Sales.....				44.0	44	4.4
Airplane Ground Schools.....				52.0	52	5.2
Airplane Parts Sales .....				21.1	21	2.0
Airports .....				44.0	44	4.4
Ambulance Service Garages .....				24.1	24	2.0
Ambulance Service Office .....				22.0	22	2.0
Ammunition Mfg. ....				31.0	31	3.1
Ammunition Storage .....				32.0	32	3.1
Ammunition Mfg. ....				31.0	31	3.1
Amphitheatre (commercial) .....				63.0	63	6.3
Amphitheatre (municipal) .....				61.0	61	6.1
Amusement Arcades .....				21.2	21	2.0
Amusement Parks .....				63.0	63	6.3
Animal Boarding .....				21.1	21	2.0
Animal Breeding (pets) .....				84.2	84	8.2
Animal Hospitals .....				21.1	21	2.0
Antiques, Sales .....				21.1	21	2.0
Apartment Hotels .....				15.3	15	1.0

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation		
	A or B	C	Reference Number For Each Column		A or B	C	Reference Number For Each Column
	A	B	C		A	B	C
Apartments .....			15.1 15 1.0	Rentals (garage) .....			24.1 24 2.0
Apairy (bees) .....			24.2 84 2.2	Repair—Brakes, Electrical Painting, Radiators, Upholstering, etc. ....			24.1 24 2.0
Appraisers .....			22.0 22 2.0	Salvage .....			31.0 31 3.1
Aquarium .....			53.0 53 5.3	Service Station .....			24.1 24 2.0
Arbaretum, Public .....	Arb. Arb.		61.0 61 6.1	Shawrooms .....			24.1 24 2.0
Architects .....			22.0 22 2.0	Storage .....			32.0 32 3.1
Arch'ts Supplies .....			21.1 21 2.0				
Armored Car Service Garage .....			45.0 45 4.6				
Armored Car Service Office .....			22.0 22 2.0				
Armory .....	Arm. G		51.0 51 5.1				
Army and Navy Goods Sales .....			21.1 21 2.0	B			
Army Inst. Vations .....	Army G		51.0 51 5.1	Bag Cleaning .....			31.0 31 3.1
Arsenal, Government Property .....			51.0 51 5.1	Baggage (See Express) Warehouse .....			
Art Gallery, Commercial Sales .....			21.1 21 2.0	Bags, Mfg. .....			31.0 31 3.1
Art Museum, Public .....	Art C		53.0 53 5.3	Bakers & Baked Goods, Mfg. ....			31.0 31 3.1
Art Museum, Private .....			53.0 53 5.3	Bakers & Baked Goods, Sales. ....			21.1 21 2.0
Art Needle Wark .....			21.1 21 2.0	Ball Park, Public. ....			61.0 61 6.1
Art School, Commercial .....			22.0 22 2.0	Ball Park, Private .....			63.0 63 6.3
Art School Institute .....			52.0 52 5.2	Ball Rooms .....			21.2 21 2.0
Artificial Limbs Mfg. .....			31.0 31 3.1	Band Shell .....			61.0 61 6.1
Artificial Limbs Sales and Service .....			21.1 21 2.0	Banks & Trust Companies .....			22.0 22 2.0
Artists, Commercial and Display .....			22.0 22 2.0	Barbecue Stand .....			21.1 21 2.0
Artists' Materials and Supplies .....			21.1 21 2.0	Barbers .....			21.1 21 2.0
Asbestos, Mfg. .....			31.0 31 3.1	Barber School .....			21.1 21 2.0
Asbestos Products, Sale .....			21.1 21 2.0	Barbers' Supplies, Distributors and Dealers .....			22.1 22 2.0
Ash Dumps .....			72.0 72 7.1	Barge, Gasoline, Retail Sales .....			46.0 46 4.6
Asphalt and Asphalt Products Processing .....			31.0 31 3.1	Barge Terminal .....			46.0 46 4.6
Assayers (See Laboratory) .....				Barrel Mfg. .....			31.0 31 3.1
Assembly Halls .....	Hall A		58.0 58 5.8	Bar (selling liquor) .....			21.1 21 2.0
Associations, Clubs & Lodges (private) .....	F.H. A		58.0 58 5.8	Baseball Park—Private .....			63.0 63 6.3
Asylums .....			56.0 56 5.6	Baseball Park—Public .....			61.0 61 6.1
Athletic Clubs .....	F.H. A		58.0 58 5.8	Bathhouses, Public .....			61.0 61 6.1
Athletic Fields—City Prop. ....			61.0 61 6.1	Bath House, Private Commercial .....			63.0 63 6.3
Athletic Fields—Private Property .....			63.0 63 6.3	Bathroom Accessories Display & Sales .....			21.1 21 2.0
Auctioneers .....			21.1 21 2.0	Bathroom Accessories Mfg. ....			31.0 31 3.1
Auditorium—Public .....	Aud. A		58.0 58 5.8	Baths, Mineral Springs (public) .....			61.0 61 6.1
Auditorium—Theatres & Commercial .....			21.2 21 2.0	Baths, Turkish (private) .....			21.2 21 2.0
Auto Courts .....			21.3 21 2.0	Battery Service .....			24.1 24 2.0
Automobiles				Beach—Private Commercial .....			63.0 63 6.3
Accessories .....			21.1 21 2.0	Beach—Public .....			61.0 61 6.1
Assembly .....			31.0 31 3.1	Beauty Culture Schools .....			22.0 22 2.0
Body Repairs .....			24.1 24 2.0	Bed Mfg. (See Furniture Mfg.) .....			21.1 21 2.0
Bodies, Sales (used) .....			32.0 32 3.1	Beer, Brewing .....			31.0 31 3.1
Car Wash .....			24.1 24 2.0	Beer & Ale Distributor, Wholesale & Storage .....			32.0 32 3.1
Garages, Drive-Yourself .....			24.1 24 2.0	Bees .....			84.2 84 8.2
Garages, Public .....			24.2 24 2.0	Beet Sugar Manufacturing .....			31.0 31 3.1
Junk Yard, Parts .....			32.0 32 3.1	Belting Mfg. .....			31.0 31 3.1
Manufacture .....			31.0 31 3.1	Beverages, Bottling .....			31.0 31 3.1
Outdoor Sales Lots .....			24.1 24 2.0	Beverages, Wholesale & Storage .....			32.0 32 3.1
Paint Shop .....			24.1 24 2.0	Bible Institute .....			54.0 54 5.4
Parking .....			24.2 24 2.0	Bibles, Sales .....			21.1 21 2.0
Parts & Supplies (new) .....			21.1 21 2.0	Bicycles, Repair .....			21.1 21 2.0
Parts & Supplies (used) .....			32.0 32 3.1	Bicycles, Sales .....			21.1 21 2.0
				Billiard Parlors .....			21.2 21 2.0
				Biscuit Companies, Mfg. ....			31.0 31 3.1

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation		
	A or B	C	Reference Number For Each Column		A or B	C	Reference Number For Each Column
	A	B	C		A	B	C
Biscuits, Wholesale & Storage....	32.0	32	3.1	Business in Back Yard (See particular business operation)	B.C.	E	52.0
Blacksmiths .....	31.0	31	3.1	Business College (private).....			52
Blast Furnaces .....	31.0	31	3.1	Business Machines			5.2
Bleacheries, Cloth Processing.....	31.0	31	3.1	Distribution & Sales.....			2.0
Bleaching Compound Mfg.....	31.0	31	3.1	Manufacturing .....			3.1
Blind People's Home .....	B.P.H.	W	57.0	Repair & Service .....			2.0
Blood Banks .....		55.0	55	Storage & Wholesale.....			3.1
Blue Printing .....		21.1	2.0	Butane Distributors .....			3.1
Blueing Mfg. ....		31.0	31	Butane Mfg., Sales & Storage.....			3.1
Boarding House .....		15.2	15	Butcher Shops .....			2.0
Boardwalk, Amusement, Commercial .....		63.0	63	Butchers' Supplies Sales.....			2.0
Boat, Pleasure, Storage, Sales....		21.1	21	Butter & Cheese Mfg.....			3.1
Boat Club .....		63.0	63				
Boat Mfg. ....		31.0	31				
Boiler, Mfg. & Repairing.....		31.0	31	C			
Boilers, Sales .....		22.1	2.0	Cabinet Makers .....			3.1
Bolts & Nuts, Mfg.....		31.0	31	Cafes .....			2.0
Bolts & Nuts Sales (hw.) .....		21.1	21	Camera Shop .....			2.0
Banding Companies .....		22.0	22	Camps, Day .....	CAMP	—	63.0
Bones—Reduction Distillation....		31.0	31	Camps, Summer .....	CAMP	—	63.0
Bookbinders .....		31.0	31	Can Manufacture (See Metals)			6.3
Bookkeeping Machine Sales (See Business Machines) .....				Canals, (Locks, etc.) .....			4.6
Book Publishing, Offices.....		22.0	22	Candle Manufacture .....			4.6
Book Publishing, Printing.....		31.0	31	Candy, Mfg. .....			3.1
Booksellers .....		21.1	21	Candy, Shops (retail) .....			3.1
Botanical Gardens .....		61.0	61	Candy, Wholesale Distribution....			3.1
Bottle Mfg. ....		31.0	31	Cannery .....			3.1
Bottlecaps & Seals, Mfg. ....		31.0	31	Canvas Goods Sales.....			2.0
Bottled Gas, Mfg. ....		31.0	31	Canvas Mfg. ....			2.0
Bottled Gas, Storage & Distribution .....		32.0	32	Cap & Hat Manufacture (See Hats)			3.1
Bowling Alleys .....		21.2	2.0	Car Barns .....			4.6
Boxes, Mfg. ....		31.0	31	Car Manufacture (See Automobiles)			4.6
Boxes, Sales Offices.....		22.1	22	Car Manufacture, Railroad.....			3.1
Braces, Orthopedic, Sales.....		21.1	21	Carbide Mfg. ....			3.1
Brake Lining Mfg. ....		31.0	31	Carbide Sales & Distribution....			3.1
Breweries .....		31.0	31	Carbonic Gas Sales & Storage....			3.1
Brick Kilns .....		31.0	31	Carbonic Ice Mfg. ....			3.1
Brick Storage .....		32.0	32	Carburators (See Automobile Repair)			3.1
Broadcasting Station (Tower) .....		73.4	73	Carpenters, Contractor's Office...			2.0
Broadcasting Studio .....		22.0	22	Carpenters' Shops and Power			2.0
Brokerage House .....		22.0	22	Woodworking .....			3.1
Brooms & Brushes, Mfg. ....		31.0	31	Carpet Manufacture .....			3.1
Brushes, Sales .....		21.1	21	Carpet & Rug Cleaners & Storage....			3.1
Building Contractors, Equipment & Material Storage..		32.0	32	Carpets & Rugs, Warehouses....			3.1
Building Contractors' Offices.....		22.0	22	Carton Mfg. ....			3.1
Building & Loan Associations.....		22.0	22	Caselin Manufacture .....			3.1
Building Materials (Retail) .....		21.1	21	Cash Registers (See Business Machines)			3.1
Building Materials, Wholesale and Storage.....		32.0	32	Caskets, Mfg. ....			3.1
Buildings, Office .....		22.0	22	Caskets, Retail Sales .....			2.0
Bungalow Courts (see Tourist Courts)				Cast Iron Pipe Manufacture.....			3.1
Burglar Alarm Watching Service..		22.0	22	Casting Foundry (See Metals)			3.1
Bus Line Shops, Garage, Repair... Bus Stations, Depots.....		45.0	45	Cat & Dog Hospital .....			2.0
		45.0	45	Caterers .....			2.0
				Catholic School (See Schools)			2.0
				Cattle Shed .....			8.5
				Caustic Soda Manufacture.....			3.1
				Cellophane Mfg. ....			3.1
				Cement Products Mfg. (pipe, blocks, etc.) .....			3.1

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation				
	A or B	C	A	B	C	A or B	C		
Cement Storage .....			32.0	32	3.1	Coin Machines, Rental & Service...	32.0	32	3.1
Cemeteries .....			64.0	64	6.4	Cold Storage .....	32.0	32	3.1
Cesspool Builders & Service			32.0	32	3.1	Coliseum, City .....	58.0	58	5.8
Equipment Yard .....			32.0	32	3.1	Coliseum, Private, Commercial...	21.2	21	2.0
Chair Manufacture (See Furniture)			32.0	32	3.1	Collection Agencies .....	22.0	22	2.0
Chairs, Folding, Rental.....			31.0	31	3.1	College .....	COL.	E	52.0
Chalk Manufacture .....			31.0	31	3.1	Comfort Station .....			51.0
Chandler, Ship's, Offices.....			22.1	22	2.0	Commission House, Office.....			22.0
Charcoal Manufacture &			31.0	31	3.1	Community Centers .....	CTR.	A	58.0
Pulverizing .....			57.0	57	5.7	Concert Hall .....			53.0
Charitable Institution .....			31.0	31	3.1	Concrete Contractors,			32.0
Cheese Mfg. ....			31.0	31	3.1	Storage Yards .....			32
Chemicals & Drugs Mfg....			31.0	31	3.1	Concrete Products (pipe, beams), Mfg. ....			31
Chemicals & Drugs Storage & Distribution .....			32.0	32	3.1	Concrete, Transit Mix.....			31
Chemists, Analytical & Consulting (See Laboratories)			31.0	31	3.1	Condensed Milk Manufacture.....			31
Chewing Tobacco Mfg.....			84.2	B4	8.2	Confectioners, Mfg. ....			31
Chicken Farm .....			22.0	22	2.0	Confectioners, Wholesale .....			22
Child Guidance Clinic, Private....			21.1	21	2.0	Conservatory, Botanical .....			53.0
Children's & Infants' Wear, Sales.			21.1	21	2.0	Conservatory, Musical (See Schools)			53
China, Retail .....			21.1	21	2.0	Consultants .....	EMB.	G	51.0
Chinese Laundry .....			22.0	22	2.0	Container Mfg. ....			31
Chiropractors .....			22.0	22	2.0	Contractors' Equipment & Supplies			32
Chiropractors .....			31.0	31	3.1	Contractors' Office .....			21
Chlorine Mfg. ....			31.0	31	3.1	Convention Building (See Auditorium) .....			54
Chocolate & Cocoa Products Mfg.			22.0	22	2.0	Convents .....	CNVT.	R	54.0
Christian Science Practitioners....			54.0	54	5.4	Coolers (See Air Conditioning) .....			54
Christian Science Reading Rooms..						Copper Manufacture (See Metals)			
Churches & Sunday School Buildings .....	CH.	R	54.0	54	5.4	Cordage Mill .....			31
Cider & Vinegar Manufacture....			31.0	31	3.1	Correspondence School .....			31
Cigar Stores .....			21.1	21	2.0	Corrugated Metal Manufacture (See Metals) .....			22
Cigarette & Cigar Mfg. ....			31.0	31	3.1	Corsets & Brassieres, Mfg. ....			31
Cigars, Wholesale & Storage....			32.0	32	3.1	Corsets & Brassieres, Sales. ....			31
City Buildings .....			51.0	51	5.1	Cosmetics, Mfg. ....			31
City Garages .....			45.0	45	4.6	Costume Rentals .....			31
City Halls .....	C.H.	G	51.0	51	5.1	Cotton Ginning .....			21
Clay Products, Mfg. ....			31.0	31	3.1	Cotton Product Ss, Mfg. ....			31
Clay Pit .....			33.0	33	3.3	Cotton Spinning & Weaving .....			31
Cleaners .....			21.1	21	2.0	Country Clubs .....			63
Cleaning Compounds Mfg. ....			31.0	31	3.1	County Court House .....	C.Ho.	G	51.0
Cleaning & Dyeing Distribution Shops .....			21.1	21	2.0	County Office Buildings.....	Off.	G	51.0
Cleaning & Dyeing Processing....			31.0	31	3.0	County Homes .....	Home	W	57.0
Clinics, Hospital .....			55.0	55	5.5	Courthouse .....	C.Ho.	G	51.0
Clinics, Doctors Office.....			22.0	22	2.0	Creameries (See Dairy) .....			51
Clock Factory .....			31.0	31	3.1	Credit Reporting Bureaus. ....			51
Clothing, Mfg. ....			31.0	31	3.1	Credit Union Bureaus. ....			51
Clothing, Retail .....	F.H.	A	21.1	21	2.0	Crematories .....			64
Clubs, Private, Social or Fraternal			58.0	58	5.8	Creosote Treatment or Mfg. ....			64
Clubs, Supper & Amusement....			21.2	21	2.0	Crockery Mfg. ....			31
Cool & Coke Yards.....			32.0	32	3.1	Crockery Sales .....			31
Cool Mining .....			33.0	33	3.3	Curio Shops .....			21
Cool Tar Distillates or Products....			31.0	31	3.1	Currency Exchange .....			21
Cocktail Lounges .....	BAR	—	21.1	21	2.0	Curtain Cleaners (See Cleaning)			22
Coffee, Wholesale & Storage....			32.0	32	3.1	Custom House, U. S. ....			22
Coffee Roasting .....			31.0	31	3.1	Cylinder Reborning & Regrinding (See Automobile Repair)			22
Coin Dealers .....			21.1	21	2.0				51

LAND USE	Suggested Letter Designation			Reference Number For Each Column	LAND USE	Suggested Letter Designation			Reference Number For Each Column						
	A or B	C	A			A or B	C	A							
<b>D</b>															
Dairies .....	31.0	31	0.1		Driving Schools, Auto.....			2.0	22	2.0					
Dairies, Retail Sales of Products..	21.1	21	2.0		Drugless Physicians .....			2.0	22	2.0					
Dairy Farm .....	85.0	85	8.5		Drugs, Mfg. ....			31.0	31	3.1					
Dairy Products, Mfg. ....	31.0	31	3.1		Drugs, Retail Sales.....			21.1	21	2.0					
Dance Hall .....	21.2	21	2.0		Drugs, Wholesale Storage.....			32.0	32	3.1					
Dancing School .....	22.0	22	2.0		Dry Cleaning Establishment (depot only) .....			21.1	21	2.0					
Decoration, Display Room and Office .....	22.0	22	2.0		Dry Cleaning, Establishment, Bulk Processing .....			31.0	31	3.1					
Decoration, Workshop and Equipment Yard .....	32.0	32	3.1		Dry Dock .....			46.0	46	4.6					
Delicatessens .....	21.1	21	2.0		Dry Goods .....			21.1	21	2.0					
Delivery Service Office.....	22.0	22	2.0		Dry Goods, Wholesale or Storage.....			32.0	32	3.1					
Dental Laboratories .....	22.0	22	2.0		Dry Ice Mfg. (See Carbonic Gas Mfg.) .....										
Dental Supplies .....	21.1	21	2.0		Dude Ranch .....			63.0	63	6.3					
Dentists .....	22.0	22	2.0		Dumps .....			72.0	72	7.1					
Department Stores .....	21.1	21	2.1		Duplex .....			11.2	11	1.0					
Department Stores Warehouse..	32.0	32	3.1		Duplicating Machines & Supplies (See Business Machines) .....										
Desks, Sales .....	21.1	21	2.0		Dyeing, Commercial, Bulk.....			31.0	31	3.1					
Detective Agencies .....	22.0	22	2.0		Dyesuffs, Mfg. .....			31.0	31	3.1					
Detention Homes .....	57.0	57	5.7												
Diaper Supply Service.....	21.1	21	2.1												
Dictating Machines, Sales (See Business Machines)					<b>E</b>										
Diesel Engines, Mfg. ....	31.0	31	3.1		Eggs, Poultry Farms.....			84.2	84	8.2					
Diesel Engines Service, Equipment & Supplies (not mfg.) .....	32.0	32	3.1		Eggs, Storage & Processing.....			31.0	31	3.1					
Disinfectants, Mfg. ....	31.0	31	3.1		Electric Contractors' Offices.....			22.0	22	2.0					
Disinfectants, Storage & Wholesale .....	32.0	32	3.1		Electric Contractors' Shops.....			32.0	32	3.1					
Dispensary, Private Clinic.....	21.1	21	2.0		Electric Equipment, Mfg. ....			31.0	31	3.1					
Dispensary, Public .....	55.0	55	5.5		Electric Generating Plant.....			73.1	73	7.3					
Display Designers & Builders' Shops	32.0	32	3.1		Electric Light & Power Companies, Offices & Billing .....			22.0	22	2.0					
Disposal Plants (sewage) .....	71.0	71	7.1		Electric Light & Power Companies, Yards .....			32.0	32	3.1					
Distillation of Coal, Wood, Barrels.	31.0	31	3.1		Electric Plating .....			31.0	31	3.1					
Distillers, Liquor .....	31.0	31	3.1		Electrical Appliances, Mfg. ....			31.0	31	3.1					
Distillers, Distribution, Warehouse .....	32.0	32	3.1		Electrical Appliances, Sales & Repairs .....			21.1	21	2.0					
Distributing Service, Garages.....	45.0	45	4.6		Electrical Appliances, Wholesale & Storage .....			32.0	32	3.1					
Dock, Shipping .....	46.0	46	4.6		Elementary School .....			E.Sc.	E	52.0					
Dock, Serving an Industry (See Industry or Public Utility)					Elevators, Grain .....					52	5.2				
Doctors' Offices .....	22.0	22	2.0		Elks Club .....			F.H.	A	58.0					
Dog & Cat Hospitals .....	21.1	21	2.0		Embalming Establishment .....					58	5.8				
Dog Kennels .....	21.1	21	2.0		Embossay .....					21.1	21	2.0			
Dog Pound .....	51.0	51	5.1		Emery Cloth & Sandpaper Mfg. ....					51.0	51	5.1			
Doors, Mfg. ....	31.0	31	3.1		Employment Agencies .....					31.0	31	3.1			
Dramatic School .....	52.0	52	5.2		Enameling & Painting .....					22.0	22	2.0			
Draperies, Mfg. ....	31.0	31	3.1		Engine Manufacture .....					31.0	31	3.1			
Draperies, Sales .....	21.1	21	2.0		Engineers, Offices .....					22.0	22	2.0			
Drawing Materials, Sales.....	21.1	21	2.0		Engravers .....					31.0	31	3.1			
Dress Shop, Sales.....	21.1	21	2.0		Envelope Manufacture .....					31.0	31	3.1			
Dressmakers, Custom .....	21.1	21	2.0		Estate—House & Bldgs. ....					11.1	11	1.0			
Drilling Companies Offices.....	22.0	22	2.0		Estate—Grounds .....					63.0	63	6.3			
Drilling Company Equipment Yards	32.0	32	3.1		Excelsior, Mfg. .....					21.0	31	3.1			
Drive-in Markets .....	21.1	21	2.0		Excelsior, Storage & Distribution (bulk) .....					32.0	32	3.1			
Drive-in Restaurants .....	21.1	21	2.0		Exhibition Buildings, Commercial.....					21.2	21	2.0			
Drive-in Theatres .....	63.0	63	6.3		Exhibition Buildings, Public.....					58.0	58	5.8			
Driving Range, Golf.....	63.0	63	6.3		Explosives, Mfg. .....					31.0	31	3.1			
					Explosives, Storage & Distribution.....					32.0	32	3.1			

Ex.

A

LAND USE	Suggested Letter Designation	Reference Number For Each Column			LAND USE	Suggested Letter Designation	Reference Number For Each Column							
		A or B	C	A	B	C	A or B	C	A	B	C			
Express Companies, Garages.....		45.0	45	4.6	Fish, Curing, Packing.....		31.0	31	3.1					
Express Companies, Office only...		22.0	22	2.0	Fish Hatchery .....		61.0	61	6.1					
Express Companies, Warehouses..		32.0	32	3.1	Fish Markets, Retail.....		21.1	21	2.0					
Exterminating & Fumigating,					Flags & Banners, Mfg.....		31.0	31	3.1					
Commercial Shops .....		32.0	32	3.1	Flot (2 family).....		11.2	11	1.0					
Exterminator & Insect Poison Mfg.		31.0	31	3.1	Flots (3 or more families).....		15.1	15	1.0					
Extrusion of Metals.....		31.0	31	3.1	Floor Materials (linoleums), Mfg..		31.0	31	3.1					
<b>F</b>														
Fabrics, Weaving and Spinning...		31.0	31	3.1	Floor Materials & Laying, Sales..		21.1	21	2.0					
Fairgrounds .....		61.0	61	6.1	Floor Polish & Wax Mfg.....		31.0	31	3.1					
Fairgrounds Building .....		61.0	61	6.1	Floor Refinishing, Contractors Shop .....		32.0	32	3.1					
Farm Implements & Machinery Assembly .....		31.0	31	3.1	Florists, Greenhouses & Nurseries		84.1	84	8.2					
Farm Implements & Machinery Soles .....		21.1	21	2.0	Florists, Soles .....		21.1	21	2.0					
Farm Labor Contractors.....		22.0	22	2.0	Flour & Grain Storage & Elevators		32.0	32	3.1					
Farmland					Flour Mills .....		31.0	31	3.1					
Apairy .....		84.2	84	8.2	Flying Field .....		44.0	44	4.0					
Crops (field) .....		81.0	81	8.1	Food Locker Storage.....		32.0	32	3.1					
Dairy .....		85.0	85	8.5	Food Products, Retail Sales..		21.1	21	2.0					
Fruit .....		83.0	83	8.2	Food Products, Warehouse..		32.0	32	3.1					
Livestock .....		85.0	85	8.5	Football Field, Public.....		61.0	61	6.1					
Nurseries, Truck Farms.....		84.1	84	8.2	Forest Land .....		92.0	92	9.2					
Orchards (fruits & nuts).....		83.0	83	8.2	Forests, County, State, National..		61.0	61	6.1					
Poultry .....		84.2	84	8.2	Forge Plants .....		31.0	31	3.1					
Fat Rendering .....		31.0	31	3.1	Foundries .....		31.0	31	3.1					
Federal Offices .....	Off.	G	51.0	51	5.1	Fox Farms .....		84.2	84	8.2				
Feed (grains), Manufacture & Processing .....		31.0	31	3.1	Fraternal Halls .....		F.H.	A	58.0	58	5.8			
Feed, Retail, Distribution and Sales Office .....		21.1	21	2.0	Fraternity Houses .....		15.2	15	1.0					
Feed, Wholesome & Storage.....		22.0	32	3.1	Freight Depot, Railroad (See Express also).....		43.0	43	4.3					
Feedlot .....		85.0	85	8.5	Freight Forwarders' Warehouses..		32.0	32	3.1					
Felt, Mfg. ....		31.0	31	3.1	Frozen Foods, Processing.....		31.0	31	3.0					
Fences, Metal, Fabrication Mfg. ....		31.0	31	3.1	Frozen Foods, Wholesale Storage and Distribution.....		32.0	32	3.1					
Fences, Metal, Wholesale & Storage .....		32.0	32	3.1	Fruit Stores, Retail.....		21.1	21	2.0					
Ferry Building .....		45.0	46	4.6	Fruit & Veg. Processing.....		31.0	31	3.1					
Ferry Docks, Passenger.....		46.0	46	4.6	Fruit & Veg. Market, Retail.....		21.1	21	2.0					
Ferry Docks, Railroad.....		43.0	43	4.3	Fruit & Veg. Market, Wholesale..		32.0	32	3.1					
Fertilizers, Mfg. ....		31.0	31	3.1	Fuel Distributing Station .....		32.0	32	3.1					
Fertilizers, Storage .....		32.0	32	3.1	Fuel Oil Dealer .....		32.0	32	3.1					
Filing Equipment & Supplies Soles (See Office Equipment)					Funeral Parlors, Homes .....		21.1	21	2.0					
Filling Station, Gasoline.....		24.1	24	2.0	Fur Farms .....		64.2	64	6.2					
Finance Companies, Loan Offices..		22.0	22	2.0	Fur Preparation (tanning).....		31.0	31	3.1					
Fire Alarm Station .....		51.0	51	5.1	Fur Warehouse .....		32.0	32	3.1					
Fire Clay Products Manufacture..		31.0	31	3.1	Furnaces, Cleaning & Repairing Shops .....		32.0	32	3.1					
Fire Drill Towers .....		51.0	51	5.1	Furnaces, Display & Sales..		21.1	21	2.0					
Fire Protection Equipment and Supplies .....		21.1	21	2.0	Furnished Rooms .....		15.2	15	1.0					
Sales .....				Furniture, Mfg., Metal or Wood..		31.0	31	3.1						
Fire Station .....	Fire. G		51.0	51	5.1	Furniture, Display & Sales..		21.1	21	2.0				
Fire Watch Towers .....			51.0	51	5.1	Furniture, Repairing & Refinishing, Cleaning .....		32.0	32	3.1				
Fireproofing, Mfg. ....			31.0	31	3.1	Furniture, Used .....		21.1	21	2.0				
Firewood, Storage .....			32.0	32	3.1	Furniture, Wholesale & Storage..		32.0	32	3.1				
Fireworks or Explosives, Mfg. ....			31.0	31	3.1	Furs, Custom Cleaning, Remodel- ing, Repairing & Storage..		21.1	21	2.0				
Fish, Wholesale .....			32.0	32	3.1	Furs, Mfg., Cutting & Assembly..		31.0	31	3.1				
					Furs, Retail Sales .....		21.1	21	2.0					
					<b>G</b>									
					Galleries (art), public.....		Art	C	53.0	53	5.3			

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation							
	Reference Number For Each Column				Reference Number For Each Column							
	A or B	C	A	B	C	A or B	C					
Game Preserves (public).....			61.0	61	6.1	Hot & Cop., Retail Soles.....		21.1	21	2.0		
Garage, Equipment, Soles.....			21.1	21	2.0	Hot Cleaners & Renovators.....		21.1	21	2.0		
Garage, Auto Repair.....			24.1	24	2.0	Hot Mfg. ....		31.0	31	3.1		
Gorges, Public Storage.....			24.2	24	2.0	Hotheries, Birds .....		31.0	31	3.1		
Gorbage, Reduction, Scavenging.			72.0	72	7.1	Hoy & Straw, Soles, Storage.....		32.0	32	3.1		
Gormet Factory .....			31.0	31	3.1	Health Center, Charitable						
Gas, Appliances, Soles.....			21.1	21	2.0	or Institutional .....		55.0	55	5.5		
Gas, Bottled, Mfg. ....			31.0	31	3.1	Health Clinics, Public.....		55.0	55	5.5		
Gas Companys' Offices.....			22.0	22	2.0	Health Food Products, Soles.....		21.1	21	2.0		
Gas Stations (gasoline).....			24.1	24	2.0	Heating Contractors' Offices.....		22.0	22	2.0		
Gas Wells, Natural.....			33.0	33	3.3	Heating Contractors, Shops, Yards.....		32.0	32	3.1		
Gas Works .....			73.2	73	7.2	Heating & Ventilating						
Gasholders, Public Utility Company			73.2	73	7.3	Apparatus, Assembly .....		31.0	31	3.1		
Gesoline, Bulk Storage Tanks.....			32.0	32	3.1	Heating & Ventilating						
Gesoline, Refineries .....			31.0	31	3.1	Apparatus, Soles .....		21.1	21	2.0		
Gesoline, Retail Soles.....			24.1	24	2.0	Heavy Castings, Mfg. ....		31.0	31	3.1		
Gelatin Manufacture .....			31.0	31	3.1	Hemstitching .....		21.1	21	2.0		
Gift Shops .....			21.1	21	2.0	Herbs, Soles .....		21.1	21	2.0		
Gloss Blowing .....			31.0	31	3.1	Hide & Tallow Mfg. ....		31.0	31	3.1		
Gloss Mfg., Window & Plate.....			31.0	31	3.1	Highway Dept. Depots.....		51.0	51	5.1		
Gloss Soles .....			21.1	21	2.0	High School .....		H.S.	E	52.0	52	5.2
Glucose Manufacture .....			31.0	31	3.1	Homes, Children's, Charitable		O.A.	W	57.0	57	5.7
Glue & Fertilizer Manufacture.....			31.0	31	3.1	Institutions or Public.....						
Golf, Miniature .....			63.0	63	6.3	Homes, Old Age, Charitable						
Golf Clubs, Private.....			63.0	63	6.3	Institutions .....						
Golf Course, Public.....			61.0	61	6.1	Horse Farm .....						
Golf Practice Driving Range.....			63.0	63	6.3	Hose Mfg. ....						
Government Buildings, Offices.....	Off. G		51.0	51	5.1	Hosiery Mfg. ....						
Grade School .....	E.S.C. E		52.0	52	5.2	Hosiery Soles & Repairing.....						
Groin Elevator .....			32.0	32	3.1	Hospitals, Public or Private.....		Hosp. M	M	55.0	55	5.5
Grondstands, Public .....			58.0	58	5.8	Hotel Equipment, Supplies & Soles.....						
Graphite Manufacture .....			31.0	31	3.1	Hotels .....						
Gravel Pits .....			33.0	33	3.3	House of Corrections (boys, girls)....		Ind. I	I	56.0	56	5.6
Grease & Tallow Manufacture.....			31.0	31	3.1	House Furnishings, Soles .....						
Greenhouses .....			84.1	84	8.2	House Movers Equipment						
Grist Mill .....			31.0	31	3.1	Storage Yards .....						
Grocers, Retail .....			21.1	21	2.0	House Wreckers, Yards.....						
Grocers, Warehouse, Wholesole.....			32.0	32	3.1	Hydrochloric Acid Mfg. ....						
Group House .....			15.2	15	1.0							
Guest Homes .....			21.3	21	2.0							
Guest Ranches .....			63.0	63	6.3							
Gunpowder Mfg. ....			31.0	31	3.1	Ice, Mfg. ....						
Guns, Soles .....			21.1	21	2.0	Ice, Package, Soles .....						
Gunsmiths, Repairs .....			21.1	21	2.0	Ice Cream, Mfg. ....						
Gymnposiums, Private, Commercial.....			21.2	21	2.0	Ice Cream Shops .....						
Gymnposiums, Public .....			59.0	59	5.9	Ice Skating Rink, Public.....						
Gypsum or Plaster of Paris Mfg. ....			31.0	31	3.1	Ice Storage, Retail Distributor.....						
<b>H</b>						Imported Goods, Retail Soles.....						
Hair Products Factory.....			31.0	31	3.1	Incineration of Animals & Garbage						
Hairdressing .....			21.1	21	2.0	Indexing Systems & Supplies, Soles						
Halls, Assembly, Institutional.....			56.0	56	5.6	Indian Goods, Wholesale and Retail						
Halls, Commercial .....			21.2	21	2.0	Indian Reservation .....						
Halls, Public .....	Hall A		58.0	58	5.8	Industrial School, General						
Hond Laundries, All Work on						Instruction, Correctional .....		Ind. I	I	56.0	56	5.6
Premises (Chinese) .....			21.1	21	2.0	Industrial Truck Body Mfg. ....						
Hangars (See Airport)						Infirmary .....		Inf. M	M	55.0	55	5.5
Hardware, Retail Soles,						Insons Asylum .....						
New & Used.....			21.1	21	2.0	Insecticides, Mfg. ....						
Hardware, Wholesole .....			32.0	32	3.1	Insecticides, Storage & Distribution						
						Institute (Bible) .....						

LAND USE	Suggested Letter Designation	Reference Number For Each Column			LAND USE	Suggested Letter Designation	Reference Number For Each Column				
		A or B	C	A	B	C	A or B	C	A	B	C
Institutional Bldg. ....		56.0	56	5.6	Lawn Mower Repair Shops. ....		21.1	21	2.0		
Insulation, Contractors' Equipment					Lawyers' Offices. ....		22.0	22	2.0		
Yards, Wholesale, Storage. ....		32.0	32	3.1	Lead (white) and Oil Mfg. ....		31.0	31	3.1		
Insulation Materials, Mfg. ....		31.0	31	3.1	Leather, Artificial or Synthetic, Mfg. ....		31.0	31	3.1		
Insurance Offices. ....		22.0	22	2.0	Leather Findings, Mfg. ....		31.0	31	3.1		
Intercommunicating Systems Sales (See Business Machines). ....		21.1	21	2.0	Leather Goods, Mfg. Fabrication, Tanning. ....		31.0	31	3.1		
Interior Decorators. ....		21.1	21	2.0	Leather Goods, Sales, Custom or Handicraft Mfg. ....		21.1	21	2.0		
I.O.O.F. Hall. ....	F.H.	A	58.0	58	5.8	Legion Hall. ....		58.0	58	5.8	
Iron, Custom Decorative					Letter, Duplicating and Mailing (See Office Service)						
Wrought Iron Shops. ....		31.0	31	3.1	Libraries, Private, Rental. ....		21.1	21	2.0		
Iron Foundry. ....		31.0	31	3.1	Libraries, Public. ....	Lib.	C	53.0	53	5.3	
Irrigation Companies & Equipment. ....		32.0	32	3.1	Lighthouse. ....		46.0	46	4.6		
Irrigation Facilities. ....		95.0	95	9.5	Lighting and Power Plants. ....		73.1	73	7.3		
J					Lime Burning, Manufacturing. ....		31.0	31	3.1		
Jails. ....	Jail	G	56.0	56	5.6	Lime Storage. ....		32.0	32	3.1	
Janitors' Supplies, Storage and Warehouse. ....			32.0	32	3.1	Linen Goods Mfg., Spinning, Weaving. ....		31.0	31	3.1	
Jewelers' Bulk Mfg. ....		31.0	31	3.1	Linen Supply Laundry Service. ....		31.0	31	3.1		
Jewlers, Retail Sales, Custom Mfg. ....		21.1	21	2.0	Linens, Sales. ....		21.1	21	2.0		
Jobbers, Bulk Materials, Office. ....		22.1	22	2.0	Linoleum Mfg. ....		31.0	31	3.1		
Juke Boxes (See Coin Machines)					Linoleum Sales. ....		21.1	21	2.0		
Junior College. ....	J.C.	E	52.0	52	5.2	Linseed Oil Mfg. ....		31.0	31	3.1	
Junior High School. ....	Jr.H.	E	52.0	52	5.2	Liquor, Dispensing Bar. ....	Bar	—	21.1	21	2.0
Junk Dealers, Yards. ....			32.0	31	3.1	Liquor, Distilleries. ....		31.0	31	3.1	
Jute Mills. ....			31.0	31	3.1	Liquor, Package Sales. ....	Liq.	—	21.1	21	2.0
K					Liquor, Storage & Wholesale. ....		32.0	32	3.1		
Kalsomine Manufacture. ....			31.0	31	3.1	Lithographers. ....		31.0	31	3.0	
Kennels. ....			21.1	21	2.0	Livery Stables. ....		32.0	32	3.1	
Kerosene Storage. ....			32.0	32	3.1	Livestock, Sales & Shipping. ....		32.0	32	3.1	
Key Shops. ....			21.1	21	2.0	Livestock, Slaughter. ....		31.0	31	3.1	
Kindergarten. ....	Kdg.	E	52.0	52	5.2	Livestock Supplies, Storage and Wholesale. ....		32.0	32	3.1	
Knit Goods Manufacture. ....			31.0	31	3.1	Loan Company Offices. ....		22.0	22	2.0	
K. of C. Hall. ....	F.H.	A	58.0	58	5.8	Loan or Pawn Shops. ....		21.1	21	2.0	
L					Lockers, Food Storage. ....		32.0	32	3.1		
Labor Unions' Offices. ....			22.0	22	2.0	Locksmiths' Repair Shops. ....		21.1	21	2.0	
Laboratories, Analytical & Chemical			32.0	32	3.1	Locomotive Mfg. ....		31.0	31	3.1	
Laboratories, Clinical. ....			55.0	55	5.5	Lodge Halls. ....	F.H.	A	58.0	58	5.8
Laboratories, Dental. ....			22.0	22	2.0	Lodging House. ....		15.2	15	1.0	
Ladies' Wear Mfg. ....			31.0	31	3.1	Lubricating Oil Manufacture. ....		31.0	31	3.1	
Ladies' Wear Sales. ....			21.1	21	2.0	Luggage Mfg. (See Leather). ....		31.0	31	3.1	
Lake. ....			95.0	95	9.5	Lumber, Cabinet Working. ....		31.0	31	3.1	
Lampblack Mfg. ....			31.0	31	3.1	Lumber, Retail Yard. ....		32.0	32	3.1	
Landscape Architects' Offices. ....			22.0	22	2.0	Lumber, Used & Wholesale. ....		32.0	32	3.1	
Landscape Gardeners & Con- tractors (Same as Nurseries). ....			84.1	84	8.2	Lunch Rooms. ....		21.1	21	2.0	
Language School. ....			52.0	52	5.2	M					
Lard Mfg. ....			31.0	31	3.1	Macaroni Mfg. ....		31.0	31	3.1	
Lath Mfg. ....			31.0	31	3.1	Machine Shops. ....		31.0	31	3.1	
Laundries, Collecting Shops. ....			21.1	21	2.0	Machine Tools, Mfg. ....		31.0	31	3.1	
Laundries, Hand (Chinese). ....			21.1	21	2.0	Machinery Dealers, Sales and Showrooms. ....		32.0	32	3.1	
Laundries, Processing. ....			31.0	31	3.1	Magazine Sales. ....		21.1	21	2.0	
Laundries, Self-Service. ....			21.1	21	2.0	Magnets (See Automobiles)					
Law School. ....			52.0	52	5.2	Mail Order Retail Catalogue Office		21.1	21	2.0	
Lawn Furniture, Sales. ....			21.1	21	2.0	Mail Order Warehouse. ....		32.0	32	3.1	
					Malleable Castings Mfg. ....			31.0	31	3.1	

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation					
	A or B	C	Reference Number For Each Column		A or B	C	Reference Number For Each Column			
	A	B	C		A	B	C			
Malt Extracts Mfg.		31.0	31	3.1	Monastery		54.0	54	5.4	
Markets, Public		21.1	21	2.0	Monuments		53.0	53	5.3	
Masonic Hall	F.H.	58.0	58	5.8	Monuments, Mfg.		31.0	31	3.1	
Massage Establishment		21.2	21	2.0	Monuments, Sale & Display		21.1	21	2.0	
Matches, Wholesale & Storage		32.0	32	3.1	Moose Hall		58.0	58	5.8	
Maternity Homes, Private		55.0	55	5.5	Morgue		55.0	55	5.5	
Mattresses Mfg.		31.0	31	3.1	Mortar, Bulk Preparation & Sales		31.0	31	3.1	
Marshland		94.0	94	9.4	Mortuary		21.1	21	2.0	
Mausoleums		64.0	64	6.4	Motels		21.3	21	2.0	
Meat & Fish Retail Sales		21.1	21	2.0	Motion Picture Equipment, Sales & Display		21.1	21	2.0	
Meat & Fish Wholesale Market		32.0	32	3.2	Motion Picture Theatres		21.2	21	2.0	
Meat Packers		31.0	31	3.1	Motor Freight Co., Garages		45.0	45	4.6	
Medical Clinics, Private Doctor		22.0	22	2.0	Motor Freight Co. Offices		22.0	22	2.0	
Medical Clinics, Public		55.0	55	5.5	Motor Freight Co. Warehouses		32.0	32	3.1	
Medical Laboratories (See Laboratories)				Motor Truck Sales & Display (See Automobiles)						
Medicines, Mfg. (See Drugs)				Motorcycles, Repairing and Sales				24.1	24	2.0
Membership Clubs (except super clubs)	F.H.	58.0	58	5.8	Movers, Garages		45.0	45	4.6	
Memorial Home Parks (cemeteries)		64.0	64	6.4	Movers, Warehouses		32.0	32	3.1	
Merchandise Brokers' Office & Display		22.1	22	2.0	Movies		21.2	21	2.0	
Messenger Service		22.0	22	2.0	Multigraphing, Commercial		31.0	31	3.1	
Metal Polish Mfg.		31.0	31	3.1	Municipal Electrical Plants		73.1	73	7.3	
Metals				Municipal Gas Works		73.2	73	7.3		
Bulk Metal Processing & Castings		31.0	31	3.1	Museums		53.0	53	5.3	
Extraction (mining)		33.0	33	3.3	Music Instruction, Commercial		22.0	22	2.0	
Machine Shop Operations		31.0	31	3.1	Music School		52.0	52	5.2	
Ore Reduction & Foundries		31.0	31	3.1	Musical Institutes & Foundations		53.0	53	5.3	
Products Fabrication & Assembly		31.0	31	3.1	Noncommercial					
Rollings Mills		31.0	31	3.1	Musical Instruments, Repairing & Sales		21.1	21	2.0	
Meters, Mfg.		31.0	31	3.1	N					
Microwave Tower		73.4	73	7.3	Naturopathic Physicians		22.0	22	2.0	
Military Academy		52.0	52	5.2	Naval Supplies, Sales		32.0	32	3.1	
Military Installations		51.0	51	5.1	Navy Yard and Naval Installations		51.0	51	5.1	
Milk Bars (refreshment stands)		21.1	21	2.0	News Dealers		21.1	21	2.0	
Milk Bottling Plant		31.0	31	3.1	News Service		22.0	22	2.0	
Milk Distributing Stations (See Dairies)		21.1	21	2.0	Newspaper Advertising Sales		22.0	22	2.0	
Milk Pasteurization		31.0	31	3.1	Newspaper Offices		22.0	22	2.0	
Milliners, Custom & Sales		21.1	21	2.0	Newspaper Printing		31.0	31	3.1	
Milliners, Wholesale		22.1	22	2.0	Night Clubs		21.2	21	2.0	
Millinery & Artificial Flower Making		21.1	21	2.0	Nike Site		51.0	51	5.1	
Mills		31.0	31	3.1	Nitric Acid or Its Derivatives Mfg.		31.0	31	3.1	
Millwork (woodworking), Mfg.		31.0	31	3.1	Noodle Mfg.		31.0	31	3.1	
Millwork, Sales & Storage		32.0	32	3.1	Notions, Mfg. & Wholesale		32.0	32	3.1	
Mimeographing (See Office Service)				Notions, Retail		21.1	21	2.0		
Mineral Springs, Public		61.0	61	6.1	Novelties, Retail		21.1	21	2.0	
Mineral Water Distillation & Bottling		31.0	31	3.1	Nurseries, Agricultural		84.1	84	8.2	
Mining		33.0	33	3.3	Nursing Homes for Aged		56.0	56	5.6	
Mining Machinery & Supplies, Display & Sales		32.0	32	3.1	Nursery Schools (child)		52.0	52	5.2	
Mink Ranch		84.2	84	8.2	Nurses Homes, Dormitory Bldgs.		55.0	55	5.5	
Mirrors, Resilvering, Custom Work, Manuf.		31.0	31	3.1	Nut Shop		21.1	21	2.0	
Missions, Religious		54.0	54	5.4	Nuts, Processing		31.0	31	3.1	
Molasses Mfg.		31.0	31	3.1	Offices		22.0	22	2.0	
				Office Equipment Mfg. (See also Business Machines)		31.0	31	3.1		
				Office Equipment Sales		21.1	21	2.0		

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation		
	A or B	B	C		A	B	C
Office Furniture, Storage & Warehouse .....				Parks, Amusement, Private.....		63.0	63
Office Service (stenographic service, letter preparation addressing and mailing, duplicating, multigraphing, mimeographing, machine tabulation, research, and statistical) .....	32.0	32	3.1	Parks Maintenance Bldgs.....		51.0	51
Oil, Fuel, Storage.....	22.0	22	2.0	Parks, Public .....		61.0	61
Oil, Vegetable, Processing.....	32.0	32	3.1	Parking Garage .....		24.2	24
Oil Burners, Installation & Repair.....	32.0	32	3.1	Parochial Schools .....	P.S.C.	52.0	52
Oil Burners, Mfg.....	31.0	31	3.1	Pattern Shop .....		32.0	32
Oil Burners, Sales & Showroom.....	21.1	21	2.0	Paving Materials Storage Yard.....		32.0	32
Oil & Gas Stations.....	24.1	24	2.0	Pawnbroker .....		21.1	21
Oil Refinery .....	31.0	31	3.1	Pencil Factory .....		31.0	31
Oil Wells .....	33.0	33	3.3	Penitentiary .....	Pen.	56.0	56
Oilcloth Mfg.....	31.0	31	3.1	Penny Arcades .....		21.2	21
Old People's Home .....	56.0	56	5.6	Perfumery Mfg.....		31.0	31
Oleomargarine Mfg.....	31.0	31	3.1	Pet Shops .....		21.1	21
Olives, Processing .....	31.0	31	3.1	Petroleum Refining .....		31.0	31
Optical Goods, Mfg.....	31.0	31	3.1	Petroleum Storage, Wholesale.....		32.0	32
Opticians, Sales .....	22.0	22	2.0	Petroleum Wells .....		33.0	33
Orchard .....	83.0	83	8.2	Pharmaceutical Products Mfg.....		31.0	31
Ordnance Mfg.....	31.0	31	3.1	Pharmacy .....		21.1	21
Ore Dumps & Elevators.....	33.0	33	3.3	Philatelist (stamps) .....		31.0	31
Ore Reduction .....	31.0	31	3.1	Phonograph Records, Mfg.....		21.1	21
Organ Mfg.....	31.0	31	3.1	Phonograph Records, Sales.....		21.1	21
Ornamental Metal Work, Production .....				Photographers, Commercial, Studios .....		31.0	31
Orphanages .....	O.A. W	57.0	57	Photographic Equipment & Supplies, Retail Sales .....		22.0	22
Orthopedic Appliances, Sales.....		21.1	21	Photostat Print Shops .....		21.1	21
Osteopathic Physicians & Surgeons .....		22.0	22	Physical Therapy Clinic .....		55.0	55
Outdoor Theaters, Commercial.....		63.0	63	Physicians' & Surgeons' Exchanges .....		22.0	22
Overall Mfg.....		31.0	31	Physicians' & Surgeons' Offices .....		22.0	22
Oxygen Equipment, Rental and Distribution .....		32.0	32	(Individual or group) .....		22.0	22
Oxygen Production .....		31.0	31	Piano, Sales .....		21.1	21
P				Piano Mfg.....		31.0	31
Package (liquor) Store.....		21.1	21	Piano Tuning, Repairing .....		21.1	21
Packing & Crating Service, Fabrication .....		31.0	31	Pickles, Processed, Wholesale and Storage .....		32.0	32
Packing Plants (meat) .....		31.0	31	Pickles, Processing .....		31.0	31
Paint Shops, Automobile (See Auto Repairs)				Picture Framing, Custom .....		21.1	21
Paint & Varnish, Bulk Storage, Warehouse .....		32.0	32	Pier (See Dock, Wharf) .....			
Paint & Varnish, Manufacture .....		31.0	31	Pies, Commercial Bakery .....		31.0	31
Paint & Varnish, Retail Sales .....		21.1	21	Pigeon Raising .....		84.2	84
Painters' Equipment & Supplies Shops, Wholesale & Storage .....		32.0	32	Pipe, Mfg.....		31.0	31
Painting Contractors, Office only .....		22.0	22	Pipe, Storage & Sales .....		32.0	32
Painting Contractors, Shop, Yard .....		32.0	32	Pipe Coverings, Contractors' Shops .....		32.0	32
Palmistry .....		21.1	21	Pipe Line (gas or oil) .....		46.0	46
Paper Mfg.....		31.0	31	Pipe Line Companies' Offices .....		22.0	22
Paper Products, Wholesale & Storage .....		32.0	32	Pipe Line Right of Way (if otherwise unused) .....		46.0	46
Parish House .....		54.0	54	Places of Worship .....		54.0	54
Parking Lots .....		24.2	24	Planing Mill .....		31.0	31
				Plaster, Mfg.....		31.0	31
				Plasterers, Contractors' Yards .....		32.0	32
				Plastic & Plastic Products, Mfg.....		31.0	31
				Plastic & Plastic Products, Sales .....		21.1	21
				Plating Works .....		31.0	31
				Playgrounds, Public .....	P.G.	61.0	61
				Plumbers' Shops, Yards .....		32.0	32
				Plumbing Fixtures & Supplies, Display & Sales .....		21.1	21

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation					
	A or B	C	A	B	C	A or S	C	A	B	C
Plumbing Fixtures & Supplies, Wholesale & Storage.....			32.0	32	3.1	Recreation Centers, Public.....		59.0	59	5.9
Police Station .....	P.D.	G	51.0	51	5.1	Reduction of Garbage, Official, etc.....		72.0	72	7.1
Political Club .....	F.H.	A	58.0	58	5.8	Reformatories .....		56.0	56	5.6
Pool—Swimming, Private, Commercial .....			21.2	21	2.0	Refreshments Stands .....		21.1	21	2.0
Pool—Swimming, Public .....			61.0	61	6.1	Refrigerators, Sales & Service.....		21.1	21	2.0
Pool Hall .....			21.2	21	2.0	Refrigerators, Wholesale, Storage.....		32.0	32	3.1
Poorhouse .....			57.0	57	5.7	Refrigerated Warehouse .....		32.0	32	3.1
Popcorn, Mfg. ....			31.0	31	3.1	Refuse Dump .....		72.0	72	7.1
Post Office .....	P.O.	G	51.0	51	5.1	Rendering Works .....		31.0	31	3.1
Potato Chips, Mfg. ....			31.0	31	3.1	Research Laboratories (See Laboratories) .....				
Poultry Feed Mfg. ....			31.0	31	3.1	Reservoirs .....		73.3	73	7.3
Poultry Raising .....			84.2	84	8.2	Residence, one-family .....		11.1	11	1.0
Poultry Slaughter & Dressing.....			31.0	31	3.1	Residence, three, four or more families .....		15.1	15	1.0
Poultry Supplies, Wholesale & Storage .....			32.0	32	3.1	Residence, two-family .....		11.2	11	1.0
Power Lines (if otherwise unused). .			73.1	73	7.3	Residential Club .....		15.3	15	1.0
Power Plant .....			73.1	73	7.3	Residential Hotel .....		15.3	15	1.0
Pressing Shops .....			21.1	21	2.0	Resort Hotels .....		21.3	21	2.0
Printers .....			32.0	32	3.1	Rest Homes, Private.....		55.0	55	5.5
Printers' Ink, Mfg. ....			31.0	31	3.1	Restaurant Equipment & Supplies, Sales .....		32.0	32	3.1
Prison .....	Pen.	I	56.0	56	5.6	Restaurants .....		21.1	21	2.0
Produce (garden), Retail Sales.....			21.1	21	2.0	Retail Stores & Shops .....		21.1	21	2.0
Produce (garden), Wholesale.....			32.0	32	3.1	Rice Cleaning & Polishing .....		31.0	31	3.1
Property Management Offices.....			22.0	22	2.0	Riding Academies .....		63.0	63	6.3
Public Relations Consultants .....			22.0	22	2.0	Riding Equipment Sales .....		21.1	21	2.0
Public Garages .....			24.2	24	2.0	River .....		95.0	95	9.5
Public Schools .....	E.Sc.	E	52.0	52	5.2	Road Building Equipment Sales & Storage .....		32.0	32	3.1
Public Utility Plants.....			73.1	73	7.3	Roadside Sales Stand, Food & Agricultural Products .....		21.1	21	2.0
Publicity Service .....			22.0	22	2.0	Roadside Sales Stand .....		21.1	21	2.0
Publishers' Offices .....			22.0	22	2.0	Rock Crushing .....		31.0	31	3.1
Pumice Mfg. ....			31.0	31	3.1	Roller Skating Rink .....		21.2	21	2.0
Pumping Station (Oil or Gas).....			46.0	46	4.6	Rolling Mills .....		31.0	31	3.1
Pumps, Repairing & Rental. ....			32.0	32	3.1	Roofers, Contractors' Offices .....		22.0	22	2.0
Pumps, Retail Sales & Display. ....			21.1	21	2.0	Roofing Materials, Storage & Sales .....		32.0	32	3.2
Q						Rooming House .....		15.2	15	1.0
Quarries .....			33.0	33	3.3	Rope Mfg. .....		31.0	31	3.1
Quick Freeze Plant. ....			31.0	31	3.1	Round House .....		43.0	43	4.3
Quilt Manufacturing .....			31.0	31	3.1	Row House .....		11.3	11	1.0
R						Rowing Club .....		63.0	63	6.3
Racetracks, Private, Commercial. ....			63.0	63	6.3	Rubber Products Mfg. ....		31.0	31	3.1
Radiator Repair (See Automobiles) .						Rubber Products Salvage .....		32.0	32	3.1
Radio, Retail Sales. ....			21.1	21	2.0	Rubber Stamps Mfg. ....		21.1	21	2.0
Radio Broadcasting Stations (Tower)			73.4	73	7.3	Rubbish Removal, Private Equipment & Storage .....		32.0	32	3.1
Radio Broadcasting Studios.....			22.0	22	2.0	Rug Cleaners .....		31.0	31	3.1
Radio, Assembling .....			31.0	31	3.1	Rug Mfg. .....		31.0	31	3.1
Radio Repair Shop .....			21.1	21	2.0	S				
Rags, Bulk Collection & Storage. ....			32.0	32	3.1	Saddlery Shops, Custom, Handmade .....		21.1	21	2.0
Rags, Processing .....			31.0	31	3.1	Safe Depositories .....		22.0	22	2.0
Railroad Agents .....			22.0	22	2.0	Safes, Sales .....		21.1	21	2.0
Railroads .....			43.0	43	4.3	Saloon .....		21.1	21	2.0
Railroads, Service & Repair Yard. ....			43.0	43	4.3	Salt Mfg. .....		31.0	31	3.1
Ranches, Cattle & Sheep.....			85.0	85	8.5	Salvage Companies Equipment and Storage Yard .....		32.0	32	3.1
Ranches, Guest .....			63.0	63	6.3					
Ranges & Stoves, Sales. ....			21.1	21	2.0					
Real Estate Sales Office.....			22.0	22	2.0					

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation					
	A or B	C	A	B	C	A	B	C		
Salvation Army .....			54.0	54	5.4	Sheet Metal Contractor, Ship Yards		32.0	32	3.1
Sand & Gravel, Extraction.....			33.0	33	3.3	Sheet Metal Work, Custom Fabrication .....		31.0	31	3.1
Sand & Gravel, Processing & Storage .....			32.0	32	3.1	Shellac Mfg. ....		31.0	31	3.1
Sandpaper Mfg. ....	San.	M	31.0	31	3.1	Shingle Mfg. ....		31.0	31	3.1
Sanitarium, Public .....			55.0	55	5.5	Shipyard .....		46.0	46	4.6
Sausage Mfg. ....			31.0	31	3.1	Shirt Factory .....		31.0	31	3.1
Savings & Loan Assns. ....			22.0	22	2.0	Shoes, Mfg. ....		31.0	31	3.1
Sawmill .....			31.0	31	3.1	Shoes, Retail Sales, Repairs....		21.1	21	2.0
Scavenger, Equipment, Storage Yard .....			32.0	32	3.2	Shoeshine Stands .....		21.1	21	2.0
School Equipment & Supplies, Wholesale .....			32.0	32	3.1	Shooting Gallery .....		21.2	21	2.0
Schools						Ship Storage Yard.....		46.0	46	4.6
Art, Commercial .....	Art	C	22.0	22	2.0	Shipping Company, Docks.....		46.0	46	4.6
Art Institute .....			52.0	52	5.2	Shipping Company, Office only...		22.0	22	2.0
Beauty .....			22.0	22	2.0	Sightseeing Tours, Passenger Depots		45.0	45	4.6
Business & Commercial, Private.	B.C.	E	52.0	52	5.2	Sign Painters, Shops.....		31.0	31	3.1
Catholic (Parochial) .....			52.0	52	5.2	Signs, Neon & Metal Fabrication..		31.0	31	3.1
Church School .....	P.Sc.	E	52.0	52	5.2	Silk Mfg. ....		31.0	31	3.1
College, Academic .....			52.0	52	5.2	Silt .....		94.0	94	9.4
Correctional (penal) .....			56.0	56	5.6	Size Mfg. ....		31.0	31	3.1
Correspondence .....			22.0	22	2.0	Skating Rink, Roller.....		21.2	21	2.0
Dancing, Private .....			22.0	22	2.0	Slag Pile .....		33.0	33	3.3
Elementary .....	E.Sc.	E	52.0	52	5.2	Slate Quarry .....		33.0	33	3.3
Flight Instruction (See Airplane)						Slaughterhouses .....		31.0	31	3.1
Health, Gymnastic, Private.....			21.2	21	2.0	Slip Covers, Custom Mfg. ....		21.1	21	2.0
High .....	H.S.	E	52.0	52	5.2	Smelting or Refining of Metals....		31.0	31	3.1
Junior High .....			52.0	52	5.2	Soaps, Mfg. ....		31.0	31	3.1
Music, Private .....			22.0	22	2.0	Soaps, Wholesale & Storage....		32.0	32	3.1
Music Institutes .....			52.0	52	5.2	Social Centers .....		58.0	58	5.8
Parochial .....	P.Sc.	E	52.	-	5.2	Soda Compound Mfg. ....		31.0	31	3.1
Physically Handicapped .....			55.0	55	5.5	Soda Fountain Supplies, Wholesale .....		32.0	32	3.1
Private, Academic .....			52.0	52	5.2	Soda Water Mfg. ....		31.0	31	3.1
Stenographic .....			22.0	22	2.0	Soft Drink Stand .....		21.1	21	2.0
Trade .....			52.0	52	5.2	Sorority Houses .....		15.2	15	1.0
Scrap Iron Storage Yard.....			32.0	32	3.1	Sound Systems & Equipment Sales & Service .....		21.1	21	2.0
Scrap Metal (junk), Processing.....			31.0	31	3.1	Soy Bean Oil Mfg. ....		31.0	31	3.1
Screens, Doors & Windows Mfg. ....			31.0	31	3.1	Spices, Processing .....		31.0	31	3.1
Screw & Bolt Mfg. ....			31.0	31	3.1	Spices, Wholesale & Storage....		32.0	32	3.1
Second Hand Goods, Personal & Furniture.....			21.1	21	2.0	Spinning Mill .....		31.0	31	3.1
Secretarial Schools (See Schools)						Sporting Goods, Mfg. ....		31.0	31	3.1
Seed, Wholesale & Retail Garden Supplies .....			21.1	21	2.0	Sporting Goods, Retail Sales....		21.1	21	2.0
Seed Treatment, Processing, Extraction of Oil.....			31.0	31	3.1	Sportswear, Retail Sales....		21.1	21	2.0
Self-Service Laundry .....			21.1	21	2.0	Springs, Auto (See Automobiles)		21.1	21	2.0
Seminary .....			54.0	54	5.4	Springs, Curative & Health.....		55.0	55	5.5
Septic Tanks, Contractors, Construction .....			32.0	32	3.1	Stables .....		32.0	32	3.1
Service Stations (gasoline).....			24.1	24	2.0	Stadium, Public .....		58.0	58	5.8
Sewage Disposal Plants.....			71.0	71	7.1	Stamp Dealers .....		21.1	21	2.0
Sewer Pipe Mfg. ....			31.0	31	3.1	Starch Mfg. ....		31.0	31	3.1
Sewer Pipe Storage .....			32.0	32	3.1	State Office Building .....		51.0	51	5.1
Sewing Machines— Sales and Repairing.....			21.1	21	2.0	Stationers, Retail Sales....		21.1	21	2.0
Shack .....			18.0	18	1.0	Statuary .....		53.0	53	5.3
						Steam Baths, Private.....		21.2	21	2.0
						Steamship Agency Office .....		22.0	22	2.0
						Steel Awnings, Custom Mfg. ....		31.0	31	3.1
						Steel Mfg., Rolling Mills, Fabricators .....		31.0	31	3.1
						Stenographer Schools (See Schools)				

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation				
	A or B	C	Reference Number For Each Column		A or B	C	Reference Number For Each Column		
	A	B	C		A	B	C		
Stenographers, Public .....		22.0	22	2.0	Theatres .....		21.2	21	2.0
Stock & Bond Brokers.....		22.0	22	2.0	Theatres, Outdoor (Drive-in).....		63.0	63	1.3
Stock Yards (livestock).....		32.0	32	3.1	Theatrical Agencies .....		22.0	22	2.0
Stone Crushing .....		31.0	31	3.1	Thermometers, Mfg. ....		31.0	31	3.1
Stone Cutting & Screening.....		31.0	31	3.1	Tin Shop, Fabrication .....		31.0	31	3.1
Stone Quarry .....		33.0	33	3.3	Tinfoil Mfg. ....		31.0	31	3.1
Storage Warehouse .....		32.0	32	3.1	Tire Repairing, Equipment & Supplies.....		24.1	24	2.0
Storage Yards, Bulk Material.....		32.0	32	3.1	Tires, Mfg. ....		31.0	31	3.1
Storage Yards, Equipment.....		32.0	32	3.1	Title Insurance Companies .....		22.0	22	2.0
Stoves & Ranges, Mfg.....		31.0	31	3.1	Tobacco .....		31.0	31	3.1
Stoves & Ranges, Wholesale Storage .....		32.0	32	3.1	Tobacco, Wholesale, Storage .....		32.0	32	3.1
Street Railway Yards & Appurtenances .....		43.0	43	4.3	Tombstone, Mfg. ....		31.0	31	3.1
Strip Mine .....		33.0	33	3.3	Tool Grinding & Sharpening .....		31.0	31	3.1
Structural Steel Mfg.....		31.0	31	3.1	Tools, Wholesale & Distribution .....		32.0	32	3.1
Student Residence .....		52.0	52	5.2	Tourists Courts .....		21.3	21	2.0
Substation Electric Power & Light Company .....		73.1	73	7.3	Tourists Homes .....		21.3	21	2.0
Sugar Refining .....		31.0	31	3.1	Tours, Gorages .....		45.0	45	4.6
Summer Residence .....		11.1	11	1.0	Tours, Offices & Passenger Depots .....		45.0	45	4.6
Sulphuric Acid Mfg.....		31.0	31	3.1	Towels, Supply Service .....		32.0	32	3.1
Surgical Supplies, Wholesale Distributors .....		22.1	22	2.0	Toys, Retail Sales .....		21.1	21	2.0
Surveyors .....		22.0	22	2.0	Tractors, Retail Sales, Display .....		21.1	21	2.0
Swamp .....		94.0	94	9.4	Trade School .....		52.0	52	5.2
Swimming Pools, Private Commercial .....		21.2	21	2.0	Trailer Camps & Courts, Residential .....		18.0	18	1.0
Swimming Pools, Public.....		61.0	61	6.1	Trolleys, Repairing .....		31.0	31	3.1
Synagogue .....	Ch.	R	54.0	54	Trolleys, Sales .....		24.1	24	2.0
Syrup & Preserve Mfg.....			31.0	31	Transit Shed (Water) .....		46.0	46	4.6
T					Trolley Bureaus .....		22.0	22	2.0
Tackle Shop, Marine Supplies .....			21.1	21	Truck Farm .....		84.1	84	8.2
Tailors, Custom .....			21.1	21	Truck Freight Movers (See Express also) .....		32.0	32	3.1
Tanks, Erection, Contractors' Yard .....			32.0	32	Truck Gorage .....		45.0	45	4.6
Tonneries .....			31.0	31	Truck Terminal .....		45.0	45	4.6
Tor, Distillation or Mfg.....			31.0	31	Trucks (some as Automobiles) .....				
Taverns .....	Bor	-	21.1	21	Trunks, Custom Repair & Retail Sales .....		21.1	21	2.0
Tax Consultants .....			22.0	22	Trunks, Mfg. ....		31.0	31	3.1
Toxicob Gorages .....			45.0	45	Trusses, Mfg., Custom & Retail... .....		21.1	21	2.0
Toxicob Stands or Yards .....			45.0	45	Trust Companies .....		22.0	22	2.0
Toxidermists .....			21.1	21	Turpentine Mfg. ....		31.0	31	3.1
Tea & Spice Packing .....			32.0	32	Turkey Ranch .....		84.2	84	8.2
Tea & Spice Retail Sales .....			21.1	21	Two-Family Dwelling .....		11.2	11	1.0
Tea Rooms .....			21.1	21	Typewriters—Sales, Rental, Repairing, Parts & Supplies (See Business Machines) .....				
Technical School .....			52.0	52	U				
Telegraph Companies, Offices .....			73.4	73	Undertakers .....		21.1	21	2.0
Telephone Companies, Facilities .....			73.4	73	Uniforms, Rental .....		21.1	21	2.0
Television & Radio Store .....			21.1	21	Union Hall .....		58.0	58	5.8
Television Studios .....			22.0	22	United States Govt. Offices .....	Off.	51.0	51	5.1
Television Transmitting Tower .....			73.4	73	University .....		52.0	52	5.2
Tenements .....			15.1	15	Upholsterers, Custom .....	G	21.1	21	2.0
Tennis Courts, Private Rental .....			63.0	63	Used Cars, Sales (See Automobiles) .....				
Tennis Courts, Public .....			61.0	61	V				
Tents & Awnings Mfg. ....			31.0	31	Vacuum Cleaners, Sales & Repairing .....		21.1	21	2.0
Tents & Awnings Sales .....			21.1	21					
Termite Control Contractor Shops .....			32.0	32					
Terrozzo Contractor Shops .....			32.0	32					
Textile Mills .....			31.0	31					

LAND USE	Suggested Letter Designation			LAND USE	Suggested Letter Designation				
	A or B	C	A	B	C	A or B	C		
Variety Stores—Retail .....			21.1	21	2.0	Window Display Installations, Studio & Shops.....	32.0	32	3.1
Varnish Mfg. ....			31.0	31	3.1	Window Glass Installation Shop..	21.1	21	2.0
Vegetable Growing .....			84.1	84	8.2	Window Shades, Sales & Repairing	21.1	21	2.0
Vegetable Market, Retail.....			21.1	21	2.0	Wines, Package, Retail Sales.....	21.0	21	2.0
Vegetable Market, Wholesale.....			32.0	32	3.1	Wines, Storage, Bottling & Wholesale .....	32.0	32	3.1
Vending Machines, Distributors & Repairs.....			32.0	32	3.1	Wire Rope & Fencing Fabrication.	31.0	31	3.1
Venetian Blinds, Custom Mfg., Installation .....			32.0	32	3.1	Wood Preserving, Treatment.....	31.0	31	3.1
Ventilating Equipment (See Air Conditioning)			21.1	21	2.0	Wood Products Mfg.....	31.0	31	3.1
Veterinarians, Clinics .....			58.0	58	5.8	Woodworking, Cabinet & Custom Millwork .....	31.0	31	3.1
VFW Hall .....			31.0	31	3.1	Wool Processing .....	31.0	31	3.1
Vinegar Mfg. ....			83.0	83	8.2	Work Farms .....	56.0	56	5.6
Vineyards .....			52.0	52	5.2	Worsted Goods Mfg.....	31.0	31	3.1
Vocational School .....						Woven Goods, Mfg.....	31.0	31	3.1
Vulcanizers (See Tires)						Wrecking Contractors' Yards.....	32.0	32	3.1
W									
Wall Board, Mfg.....			31.0	31	3.1	X			
Wall Board, Wholesale & Storage.			32.0	32	3.1	X-Ray Apparatus, Mfg. (See Electrical)			
Wallpaper, Mfg. ....			31.0	31	3.1	X-Ray Laboratories, (See Laboratories)			
Wallpapers, Sales, Display.....			21.1	21	2.0	Y			
War Memorials .....			53.0	53	5.3	Yacht Club, Private.....	63.0	63	6.3
Warehouses .....			32.0	32	3.1	Yacht Club, Public Facilities.....	61.0	61	6.1
Washing Machines, Sales & Display, Custom Repairing.....			21.1	21	2.0	Yeast Cultivation, Bulk.....	31.0	31	3.1
Washing Powder, Mfg. ....			31.0	31	3.1	Y.M.C.A. ....	56.0	56	5.6
Watches, Mfg. ....			31.0	31	3.1	Y.W.C.A. ....	56.0	56	5.6
Watches, Sales & Repairing.....			21.1	21	2.0	Z			
Water, Mineral, Drinking or Curative, Bottling & Distribution			31.0	31	3.1	Zoological Gardens, Public.....	61.0	61	6.1
Water Heaters, Service & Repairing			32.0	32	3.2	Zoos, Private, Commercial.....	63.0	63	6.3
Water Softening Equipment, Service & Repairs.....			32.0	32	3.2	Zoos, Public .....	61.0	61	6.1
Water Supplies and Distribution System .....			73.3	73	7.3				
Water Tanks, Towers.....			73.3	73	7.3				
Water Wells .....			73.3	73	7.3				
Waterproofing Materials, Mfg. ....			31.0	31	3.1				
Waterproofing Materials, Storage.			32.0	32	3.1				
Waxed Container Mfg. ....			31.0	31	3.1				
Weaving, Handicraft .....			21.1	21	2.0				
Weaving & Mending, Custom.....			21.1	21	2.0				
Weaving Mills .....			31.0	31	3.1				
Weighers, Commercial .....			32.0	32	3.1				
Welding, Equipment & Supplies.....			32.0	32	3.1				
Welding Shop .....			31.0	31	3.1				
Well Drilling, Equipment Yard.....			32.0	32	3.1				
Wharf, Amusement Pier.....			21.2	21	2.0				
Wharf .....			46.0	46	4.6				
Wharf, Serving on Industry, (See industry)									
White Lead Mfg. ....			31.0	31	3.1				
Wholesale Office .....			22.1	22	2.0				
Wholesale Produce Storage or Market, Commercial .....			32.0	32	3.1				
Winches, Equipment Rentals.....			32.0	32	3.1				
Window Cleaners Service.....			32.0	32	3.1				

## APPENDIX II

## Land Use Symbol Abbreviations

*suggested letter  
symbol abbreviations*

...for detailed studies and final maps.

In the Public, Cultural and Related category the full name of the use should be noted no matter what the scale of map, wherever it can be fitted in. The abbreviations indicated here are suggestions to be adopted whenever it is not possible to use the full name. This list of abbreviations is not complete and consequently the user must develop others to suit his needs, starting with this as a basic listing.

In general, it should be possible to use either the full name or the three and four letter abbreviations when working at the scale of Column A. For Column B, either the three and four letter abbreviations or the single letter abbreviations will suffice. For Column C, the single letter designations will, in general, be used.

The basic, single letter designations for the Public, Cultural and Related category shown on the land use classification color chart are: Governmental - G; Educational - E; Cultural - C; Religious - R; Medical - M; Institutional - I; Welfare - W; Places of Assembly - A.

USE	COLUMN A or B ABBREVIATION	COLUMN B or C ABBREVIATION
Assembly (meeting places)	A	A
Air Force	AIR F.	G
Armory	ARM.	G
Arboretum	ARB.	Abr. or Omit
Army	ARMY	G
Art Museum	ART	C
Auditorium	AUD.	A
Barracks	BAR	Omit
Baseball Park	B. PK.	Omit
Blind Peoples Home	B. P. H.	W
Business College	B. C.	E
Cultural	C	C
Camps	CAMP	Omit
Church	CH.	R
Court House	C. HO.	G
Convent	CNVT.	R
College	COL.	E
Community Center	CTR.	A
City Hall	C. H.	G

USE	COLUMN A or B ABBREVIATION	COLUMN B or C ABBREVIATION	USE	COLUMN A or B ABBREVIATION	COLUMN B or C ABBREVIATION
Educational	E	E	Museum	MUS.	C
Embassy, Consulate	EMB.	G	Navy	NAVY	G
Elementary School	E. SC.	E	Noxious (uses)	N	Omit
Exhibition Buildings	EX.	A	Offices (Govt. — Federal, State, County, Local)	OFF.	G
Fire Station	F. D.	G	Old Persons Home (County Home)	HOME	W
Fraternal Halls, Clubs	F. H.	A	Orphan Asylum	O. A.	W
Governmental	G	G	Public Hall	HALL	A
High School	H. S.	E	Police Station	P. D.	G
Industrial School for delinquent boys	IND.	I	Playground	P. G.	Omit
Institutional	I.	I	Parochial Elementary School	P. E. S.	E
Infirmary	INF.	M	Parochial High School	P. H. S.	E
Jail	JAIL	G	Post Office	P. O.	G
Junior College	J. CO.	E	Penitentiary, Prison	PEN.	I
Junior High School	JR. H.	E	Religious	R	R
Kindergarten	KDG.	E	Sanitarium	SAN.	M
Library	LIB.	C	University	UNIV.	E
Liquor Store	LIQ.	Omit	Welfare	W	W
Medical	M	M	YMCA, YWCA	Y.M., Y.W.	W

LAND USE ANALYSIS AND PROJECTION

by

DANIELLE EUGENE POWELL

B. S., Kansas State University, 1958

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AN ABSTRACT OF  
A MASTER'S THESIS

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Department of Architecture and Allied Arts

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Manhattan, Kansas

1963

Communities develop as a part of our social and economic system. The amount of land utilized by specific activities and the spatial distribution of such activities reflect the requirements of this system. However, the existing arrangement of land use is, to a large extent, a result of past growth and activities and, as these activities may have occurred in a haphazard manner, the pattern thus developed may not be that which is most efficient and orderly.

Whatever the nature of the growth, it is apparent that the land use pattern, as well as the amount of land utilized for a particular purpose, is constantly undergoing change. However, to prepare a plan for the anticipated growth of the community it is desirable to make an inventory of the present status of land utilization to show the distribution of land uses and determine the amounts and ratio presently existing between each land use activity.

This thesis involves the investigation of various methods of collecting, analyzing, and projecting land use. An attempt has been made to point out various methods open to communities and which methods may help save time and reduce the cost of carrying out an effective land use analysis and projection program.

The collection of land use information is not a primary goal, but one of the essential tools used in the preparation and administration of a comprehensive city plan. Land use surveys, for example, have applications to zoning activities, traffic studies, industrial studies, the delineation of blighted areas, and the location of public

facilities. As with all research, the land-use survey should be planned and programmed in advance. The purposes of the survey should be identified and the amount of information and the degree of detail needed should be balanced against their ultimate use.

There are, of course, variations in the scope and techniques of land use surveys. The technique employed will depend on such factors as conditions peculiar to the community, the detail of information desired, and to some degree on personal preferences. However, certain methods are costly and time consuming when not properly balanced against the ultimate use of the information. Various methods have been analyzed in the hope that they will thus be more helpful and understandable to various localities which need to use them.

Any city needs a record of the way in which the land within its boundaries is presently being used. The record of land use is not for the purpose of only ascertaining how the land is used. It provides the information necessary to observe the rate at which the city is increasing or decreasing its physical plant in the various classifications of land use. It also offers a basis for measuring the amount of land needing to be reserved in zoning for future developments of the city, the quantity of land and the most appropriate locations for various uses. The results of a land use survey are generally summarized both in map form and statistically. Various methods involved in the making of a land use map, in measuring of amounts of land use, and the tabulation of land use data have been analyzed in the hope that they will be more usable to communities.

A community's future land use requirements cannot be projected with complete accuracy. However, meaningful estimates can be made. The projection of future land use is one of the most complex and time-consuming parts of planning. Essentially, it is concerned with the estimation of the acreage required to accomodate the expansion anticipated during the planning period. Although the final product of many studies is expressed in terms of acreage, the work involved in arriving at future land requirements utilizes different measurement units, such as employees, dollar sales, dwelling units, and population. The many factors involved in land use projection have been analyzed in the hope that they will be more understandable to communities.

This thesis can be of assistance to those communities on the verge of conducting a land use survey and will help them to think more thoroughly about the problems involved in analyzing and projecting land use.